THE HEIR OF ALL THE AGES

In this beautiful painting, the artist, Mr. T. C. Gotch, has tried to picture the wonderful idea that a child of to-day is the heir of all the ages, inheriting all the treasures of learning and the achievements of the past.

The Book of Knowledge

The Children's Encyclopædia

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This is a short guide only to the principal contents of this volume. It is not possible to give the titles of all the Poems and Rhymes, Legends, Problems, colour pages, questions in the Wonder Book, and many other things that come into the volume; but in all cases are given the pages where these parts of our book begin. The full list of these things comes into the big index to the whole work.

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COLORED PLATES
The Heir of All the Ages , *Frontispiece*

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YOUR editors have admired Sir Walter Raleigh from their boyhood, and in other volumes of our book you will find much said about him. His most important claim to the admiration of American boys and girls has been hardly mentioned, however, and this story will tell you why Americans should respect his memory.

THE LOST COLONY OF ROANOKE

THE first expeditions to the New World had no idea of permanent settlement. They spent their time looking for the passage to India and China, or else sought only gold and silver. Walter Raleigh, and his half-brother, Sir Humphrey Gilbert, were among the first Englishmen who desired to set up "little pieces of England" in America. They started with seven small ships in 1578, but had a fight with the Spaniards, and returned without success. Sir Humphrey Gilbert was lost at sea, returning from a voyage to Newfoundland in 1583, but Raleigh was not discouraged.

The next year Queen Elizabeth gave him permission to settle any "remote heathen and barbarous lands," still unoccupied by Europeans, giving the people who should settle there all the rights of Englishmen, including the right to make their own laws.

TWO LITTLE SHIPS SENT OUT TO EXPLORE

Raleigh soon sent out two little ships commanded by Philip Amadas and Arthur Barlowe, which reached the coast of what is now North Carolina, July 4th, 1584. Following the coast they came to a gap in the sand banks, which fringe the coast and entered Pamlico Sound. They landed upon an island, which to their eyes seemed a paradise. The stately pines, the cedars, and the abundance of grapes, which they reported grew down to the water's edge, so that "the very beating and surge of the sea overflowed them," filled them with wonder. Game and fish were also plentiful.

The Indians were friendly and brought them fish, and were much pleased with a few trifles given them. The explorers visited the Indian village, and were charmed with all they saw. Two of the Indians agreed to go to England with them. The name of one was Manteo, and the little town on the island to-day bears his name. The whole country was named Virginia, in honour of Queen Elizabeth, who was sometimes called the "Virgin Queen."

Sir Walter Raleigh was delighted with the report of his explorers, and early in 1585 sent out over a hundred men under Ralph Lane to found a colony. Unfortunately Sir Richard Grenville, who commanded the ships which took them over, quarrelled with the Indians and set fire to their corn. This made them less willing to help the colonists. Though they did not attack them very vigorously they did try to starve them out.

THE FIRST COLONY DOES NOT PROSPER

The little colony built a little fort, but seems to have spent more time exploring and hunting gold than in planting crops. Some of them followed the Roanoke River, hoping to find a passage to China. One of the party was John White, who had some skill in drawing. He made pictures in water-colours of the Indians, at work and at play, and of their houses. Some of these were published at Frankfort, in Germany, in 1590, five years after they were

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made, to illustrate the story of the expedition, written by Thomas Hariot, the famous mathematician. Both story and pictures tell us much of Indian customs, before they were changed by the white men. The pictures themselves are in the British Museum in London.

As the Indians refused to sell their corn, the party began to suffer for want of food the next year, and the expected supplies did not come from England. Just at this time Sir Francis Drake, of whom you may read on page 848, stopped on his way home from an expedition against the Spaniards. He agreed to take the hungry, homesick men home, as they asked, and the island, which was now called Roanoke, was deserted.

A little while later Sir Richard Grenville arrived with the supplies which had been delayed, only to find the island uninhabited. He could not believe that all the men were dead, and did not guess that they had gone back to England. He thought that they were somewhere on the mainland, and so landed abundant supplies, with a guard of fifteen men, and sailed back to England.

All England was then stirred up over the war with Spain, which all saw was coming, but Sir Walter Raleigh would not give up. So in the next year, 1587, he sent out another colony, of about 150 men, women and children under John White, who drew the pictures we show you here. Governor White was ordered to go to Roanoke Island, get the supplies and the fifteen men left there the year before, and then go further north into Chesapeake Bay, where there were better harbours. The commander of the ships, however, was anxious to get back to Europe, and after a part of the men had gone to Roanoke Island in a small ship, he landed all the rest on the coast, and sailed away.

INDIAN HUNTERS AS JOHN WHITE SAW THEM

This is another of John White's pictures, showing in the foreground two Indian hunters, and behind other hunters chasing the deer. You can easily distinguish the figures he drew from life and those for which he drew upon his imagination. The physical strength of these men seems to have impressed the artist very much.

THE THIRD COLONY, AND VIRGINIA DARE

The party looked in vain for the fifteen men and the supplies, but found only a skeleton here and there. The Indians had killed the men. Since the colony had to remain, all set to work to

HOW THE SOUTHERN INDIANS COOKED

The methods of cooking among the Indians seem to have interested the first Europeans who came to America very much. The two pictures on this page show that the Indians on the North Carolina coast did not suffer for want of food. The earliest explorers tell us all kinds of food were plentiful. Here we see the preparation of a sort of stew, of fish, green corn and other things hard to recognise.

The waters of North Carolina to this day abound in fish of every description, and here is the simple method of cookery common among the Indians. Several varieties seen in the picture may be recognised by every one who has studied fish. The report of Sir Walter Raleigh's first expedition says that an Indian caught all that the ships could use in a very short time.

build huts. In the party was the governor's daughter, Eleanor White, who was the wife of Ananias Dare. To them was born, August 18, 1587, soon after they landed, a little daughter whom they named Virginia. This little girl, Virginia Dare, was the first child born of English parents in our country. The county of North Carolina, of which the island is a part, is called Dare County in her honour.

Since the Indians had not only killed the men, but had taken or destroyed the stores and supplies they were set to guard, the colony had great need of many things in order to live. Governor White, therefore, thought it necessary to take the one little ship left them and start back to England for help, when his little granddaughter was about a week old.

When he arrived in England the great Armada, which Philip of Spain expected to conquer England, was almost ready, and every ship in England was being prepared to fight. Sir Walter Raleigh made two attempts to send aid to his little colony. Once the ships were seized for the government, and the second expedition, under Governor White, was driven back by Spanish ships. Then came the Armada, about which you may read on page 848, and there were many months of fighting, in which Raleigh had a prominent part.

A CEREMONIAL DANCE AMONG THE SOUTHERN INDIANS

We are told that this picture represents a solemn festival dance among the Indians of what is now North Carolina, as seen by an Englishman more than 325 years ago. The savages, almost naked, danced around the circle of posts, striking them with their rattles as they passed. The one who could dance the longest and jump the highest was considered the winner.

Finally poor Governor White arranged with a sea-captain sailing to the West Indies to take him as a passenger, and to stop on his return voyage. Finally, in August, 1590, when his little granddaughter would have been three years old, he reached Roanoke Island.

GOVERNOR WHITE DOES NOT FIND HIS GRANDDAUGHTER

On the island there was no sign of human life; the doors of the huts stood

open, and grass grew in the fort. Chests and boxes which had been buried had been dug up. Some of his books and drawings had been scattered to the winds. There were no signs of a struggle, and the only clew was the word CROATOAN carved deep on a great tree.

Before Governor White had returned to England, it had been agreed that if the colonists decided to move, they should leave a record of the place to which they had gone, with the sign of the cross if they were in distress. There were no crosses by the word, Croatoan, which was the name of an island, to the southeast.

The ship proceeded toward the island, but one of those severe storms common on that coast sprang up and after beating about for several days the captain, in spite of the prayers of the father and grandfather, set sail for England, leaving the colonists to their fate.

Raleigh made two further efforts to find his colony, five in all, and after the failure of his last, in 1602, just before he was imprisoned, declared that he would yet see "an English nation in Virginia."

WHAT BECOME OF THE LOST COLONY OF ROANOKE

The settlers at Jamestown, after their arrival in 1607, were told that this colony had lived peacefully among the Indians for several years, adopting the Indian mode of life. Finally the medicine-men had stirred up the tribe to murder all except four men, two boys and a girl. Was this girl Virginia Dare? Perhaps.

To this day many believe that some of the colonists, at least, were adopted by the Indians, and point to the grey eyes and red hair sometimes seen among the Croatan Indians, who yet live in North Carolina. The Indians themselves say that they have been told by their grandfathers, who were told by their grandfathers, that their ancestors came over the sea and could "speak out of a book."

Photograph by Brown Bros.

THE CAPITOL OF NORTH CAROLINA AT RALEIGH

Though Sir Walter Raleigh's attempts to found a colony in the New World failed, he was not forgotten. When North Carolina became a state it named the new town, built for the capital of the state, Raleigh, in his honour. This is the capitol building in the town which reminds the people of the great man, who tried so faithfully to settle the country.

A FIGURE BURIED BY A STORM OF FIRE

This beautiful bronze figure of Mercury, the Roman god of commerce, was discovered at Herculaneum, a city nearer to the crater of Vesuvius than Pompeii, and therefore buried more deeply in the terrible catastrophe of the year 79. Mercury, who was the same god as the Hermes of the Greeks, was always represented as an athletic youth, splendidly developed by physical exercise. He was the herald of the gods, and wore wings on his sandals to carry him swiftly as the wind. Observe the graceful pose of this fine figure, now to be seen, with hundreds of other noble monuments, in the museum at Naples.

CONTINUED FROM PAGE 6038.

WHAT I SAW AT POMPEII

NOTHING will live longer in the mind of a visitor than this city of a vanished life, a sight to look upon with doubting eyes even as you walk through its streets and sit down in its houses; but something almost beyond belief, when, afterwards, you fill in all that you have seen of this city which passed out of the world in a night.

There are mightier ruins in the world than Pompeii, things bigger to look at, things bigger in history, things that stir the mind more in themselves; but nowhere is there so great an area of ruin so well restored to its former appearance as this.

Here is a city nearly two miles round, with streets of houses, with market-places and shops, with gardens and squares and monuments; all so well dug out of the earth that if the tenant of one of these houses were to come back to life, and were set down at one of the three gates of Pompeii, he would walk along the old pavement he helped to wear down 2,000 years ago, and would walk to his house quite naturally, recognising his old home, in some cases, by paintings still fresh at the gate. He would find the mosaic floor still almost as new in many of his rooms; he would find beautiful statues still unbroken; he would find the pipes which brought water to his bath still in their place; he would find the bath still capable of holding water; and he would find things at home in such a condition that no power would make him believe that his home had been buried in the earth nearly 2,000 years. It is difficult to think of anything so hard to believe as Pompeii. Every little detail has been preserved. Here, in a kitchen, is a pan on the fire, resting on the ashes which were boiling water more than fourteen hundred years before the discovery of America.

It is this which makes Pompeii almost too true to be true — the preservation, through all that dread catastrophe, through all these nineteen centuries, of *the very life of the moment when Pompeii heard its doom.*

The architecture of this vast ruin is wonderful. The freshness of some

of the colour is as if it were done yesterday. The sense of luxury is everywhere, and there is even a sort of atmosphere that comes up from the long ago. But the miles of ruin, the well-planned houses fit for kings, the famous frescoes and mosaics, which are in some cases our only picture-record of historical events, are, with all their value and their tremendous interest, not the most impressive fact of Pompeii. Pompeii is unmatched as something preserved through nearly twenty centuries, preserved in big and in little so that identity is easy; but Pompeii is unique in the world because it has stamped for ever upon the earth itself the life of a single moment in the dim mists of Time. Remember, a moment; not a period, not a day, not even an hour — but a *moment*, for one may see the pan boiling on the fire, the loaf of bread half eaten, the meat being cooked for dinner, the wine still in the bottle, the ink still in the pot, the key still in the door.

A mosaic in the floor of a doorway in Pompeii, with the words Cave Canem, "Beware of the dog."

You may visit the cellar where sixteen people hid themselves when the calamity came, where the master of the house was found with the key in his hand, a slave close behind him with money and valuables. Outside is the courtyard from which they must have fled.

You may even see the pain on a man's face as he died on that terrible day. There were no cameras to take photographs then, but Nature can do without cameras.

In the ashes where they lay, the features of these poor people were pictured as in a photograph; the ashes hardened so that the likeness was preserved through all the centuries; and when these bodies were discovered there came to Signor Fiorelli a wonderful idea. Removing the bones carefully, he filled the space with plaster, making a perfect image of the figure which had lain there, hidden from sight, for more than a thousand years. And here to-day lies the image of a man in stone, his face wrought with the very pain of death. Not all the destructiveness of Vesuvius, not all the weight of the earth for nineteen hundred years, has changed a muscle of this dead man's face, and he lies to-day, like a man turned into stone, that all the world may see something of that awful moment when a great city vanished from the earth. Near by him lies the image of a dog. And here, near the homes in which they lived, lie images of other men and women — men and women no longer now, but only forms, statues that Michael Angelo never could have rivalled.

It is almost tame, after this, to think of all the wonderful things the guide would show you if you allowed a guide to hide the interest of Pompeii from you, as guides do; but there are three wonders of Pompeii. There is the wonder that it should ever have been built, so rich in art, so poor in vision; there is the wonder that it could ever be preserved from so tremendous a destruction; and there is the wonder that it should have been lost hundreds of years and found again.

It must have been interesting to look upon, and there is no wonder that Rome flocked here to live its lighter life, that emperors and statesmen and poets and nobles had houses here. And what houses they were, occupying a whole street sometimes, lavish in paintings

HOW A CITY WAS SEALED UP BY A STORM

THE BEAUTIFUL CITY OF POMPEII, AS IT LAY HIDDEN FOR NEARLY 2,000 YEARS

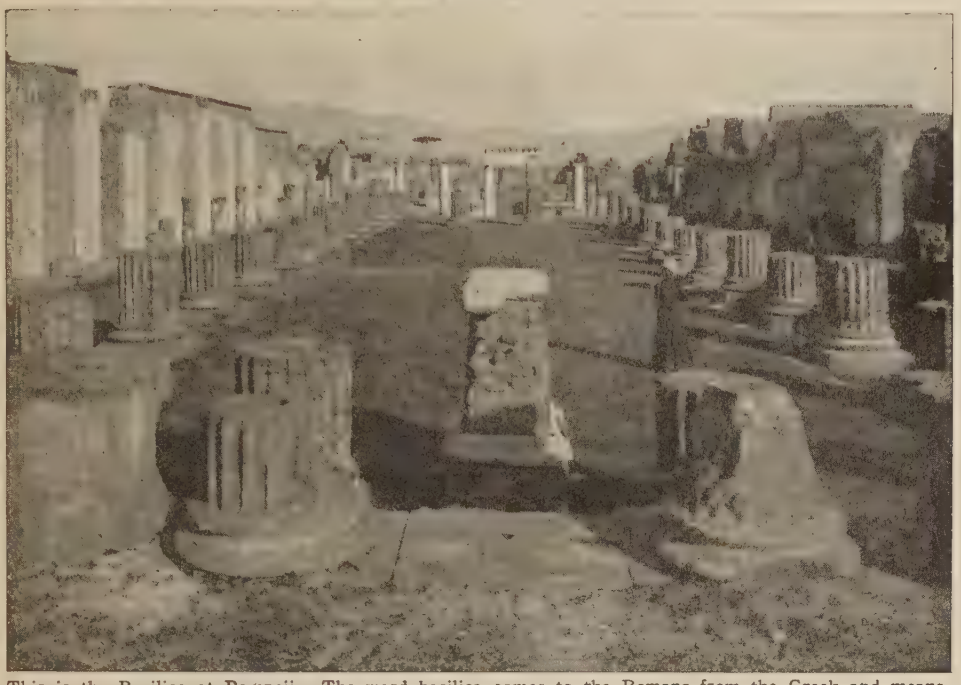
No more terrible thing ever happened to a city full of life and gaiety than the fate which befell Pompeii, with its many splendid buildings — temples, palaces, baths, and theatres — in which were stored treasures of art and learning. On the morning of August 23, in the year 79 A. D., it must have been a brilliant sight to see. But within a few days Pompeii lay buried under a sea of ashes, to be remembered only as a name for the next seventeen hundred years. Mount Vesuvius, which had been sleeping for centuries, woke up suddenly in the year 63, and caused an earthquake that destroyed a great part of Pompeii. The people rebuilt the city, and had almost finished it when a still more terrible calamity overtook them. The mountain poured forth a storm of burning ashes, which fell upon the city and buried it completely. Then heavier cinders poured forth from the mountain and sealed up the city, as shown in this picture.

POMPEII COMES OUT OF THE EARTH AGAIN

Pompeii, buried for more than seventeen hundred years, has in the past century been brought to light again, and here we see it as it is to-day. Here are the streets and pavements, the houses and shops, theatres and temples, law-courts and market-places, in which we can walk about as the old Romans did.

This shows one of the main streets of Pompeii, which has been completely unearthed. The curbstones and stepping-stones, the paths and roadway, are exactly as in the days of the Emperor Titus. Nearly all we know of the life and manners of the Romans has been revealed by the discoveries at Pompeii.

BEAUTIFUL COLUMNS COME TO LIGHT



This is the Basilica at Pompeii. The word basilica comes to the Romans from the Greek and means either a court of law or a sort of merchants' exchange. In form it was a long rectangular hall supported by great columns. Later both the word and the kind of building were borrowed for churches.

Photographs from Brown Bros.

The view of the ruins of Pompeii given on the preceding page was taken from above, and does not show the open spaces shown in this, which is even more interesting, if there can be said to be degrees of interest in this marvellous city. Notice how clearly the beautiful fluted columns stand out.

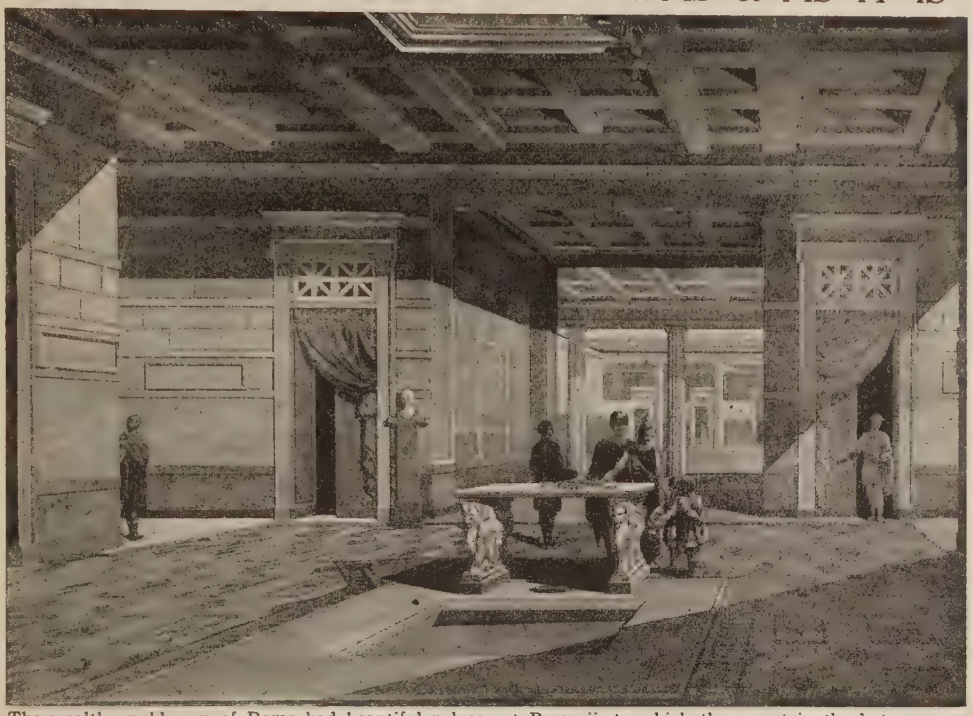
and marbles. It is odd to stand at the gate of one of these houses and look at the mosaic in the floor, a picture of a dog, with the old *Cave Canem,* "Beware of the dog," under it; and it is wonderful to stand in the garden of another house, with flowers growing now where they grew then, with lovely little statues still unbroken where they were first set up, with the gateway still fresh with paintings, with colour everywhere, and with people moving to and fro, and to imagine to yourself that the lord of the house is giving a party and you are among the guests. No great imagination is called for at Pompeii, for if imagination did not people these houses and these streets the very stones themselves would cry out. One thing you must do, however, before you go to walk about these streets of destruction: you must go upstairs and downstairs in the museum in Naples, where what is left of all that was beautiful and all that was useful in Pompeii is gathered together. Here is a collection that must stir the dullest mind that ever wandered mechanically about a great museum. Here are the marbles — frescoes, statues, columns, tombs — that made Pompeii a beautiful place to walk about in. Here are sculptures hewn in marble, that seem as near to life as those stone men and women still lying in Pompeii.

Hundreds of pieces crowd the huge ground floor of this museum, most of them in marble or in bronze, and most of them from the villas and temples and streets and spaces of this stricken city. No corner of Pompeii was left unadorned; it is astonishing to see the splendid friezes in the arcades, where things were bought and sold: even the butcher and the fishmonger, with their benches next to an emperor's temple, carried on their unlovely work in an artistic environment. It is not easy to understand how rich this place must have been until you have seen the museum, because it has been the habit in the past to carry off the art treasures of Pompeii to Naples. The city itself is to-day without roofs, like a city after a great fire has done half its work, with beautiful things left only inside houses and courtyards.

A PAN STILL ON A FIRE IN A KITCHEN IN POMPEII, AFTER BEING BURIED 1,800 YEARS

For, of course, the treasures of Pompeii can never be got together again. How much of this artistic wealth must have been destroyed in that year 79! How much was carried off by emperors

A HOUSE IN POMPEII — AS IT WAS & AS IT IS



The wealthy noblemen of Rome had beautiful palaces at Pompeii, to which they went in the hot summer months, just as people go to their country houses for a holiday nowadays. Here is the atrium, or drawing-room, of a fine house in Pompeii. The house belonged to Cornelius Rufus.

Here we see the same room as it appears to-day. In the middle is a fine marble water-basin, let into the floor and surrounded by mosaics, and on the margin are the supports of a rich marble table. Rooms opened out all round, and in the distance can be seen the remains of the peristyle — an open court.

and popes to decorate their palaces and churches! How much lies still buried in the earth, waiting for the spade to bring it into the light of day! Only half, perhaps, of this field of ruin has been recovered in these last 150 years. Eighty men are at work with their axes and spades, ever digging up houses and gardens and marbles, and nobody knows whether there may be a new piece of sculpture, or some fragment of mosaic showing Alexander winning the mastery of the world.

For hundreds of years this vast treasure-house was unknown to the world, the ancients allowing it to be covered up when they had taken from the ruins all that they thought it contained, or all that they thought worth digging for; but this great Vesuvius spat out dust enough to bury Pompeii nearly twenty feet deep, and so it happened, therefore, that the ancients robbed the surface only, leaving the depths to be trampled down or built over or neglected throughout the Middle Ages. Then a farmer would dig up a piece of marble, and perhaps it would be a man's hand. A peasant found a piece of cloth as he dug his garden one day, and used it to clean out his oven. It did not soil, it did not burn — because it was a piece of asbestos cloth in which some ancient Roman had wrapped the ashes of a dead friend!

Coming to Pompeii by train, the traveller sees green orchards with stone columns rising among the trees, filling the mind with wonder as to what lies beneath. We come, too, upon whole fields black with lava, reminding us that while men dig up one civilisation, Vesuvius is even now covering up another. So does Vesuvius find work for the excavators of the centuries, keeping busy axe and spade for ever and ever.

And those busy axes and spades, which have revealed to the eyes of men this vanished city, have brought up out of the earth much more than a collection of marbles. The ground floor of the Naples Museum is filled with monuments, but come upstairs and see *a hundred thousand things*. That is not a guess, or a mere general number; there are, indeed, a hundred thousand things, counting coins and brasses and everything that came out of the earth on Pompeii's Resurrection Day.

Here are the things with which they beautified their homes — little bronzes for the mantelpiece, hundreds of pictures from their walls, lovely vases of every kind. Here are locks and keys, and every sort of thing still used in a kitchen; pots and pans, and salt-cellars, and scales, and bottles, and knives; things for boiling twenty eggs at once; little stoves; actual beds that people slept on, chairs they sat in; stocks they put their prisoners in, in which four skeletons were found; safes in which they kept their valuables; pens they wrote with; ink still in the bottle, though now dried up; doctor's instruments such as are used to-day.

In one room are the cakes that were on the table when the calamity came, a loaf half cut, meat in a saucepan ready for cooking, peas, beans, prunes, raisins, fruits ready for dessert. Everything to eat seems to be in the room, fragments from the last dinner-tables of Pompeii, preserved through all but two thousand years by Mother Earth. And there is one thing you will not believe. There is an egg — *unbroken!* Think of it! Vesuvius destroyed this city, drove off its population, cut off at least 2,000 lives, all in an hour. It buried this city under thousands and thousands of tons of dust, buried it in the earth through all the years while Europe has been made. Vesuvius could do this, yet could not break an egg!

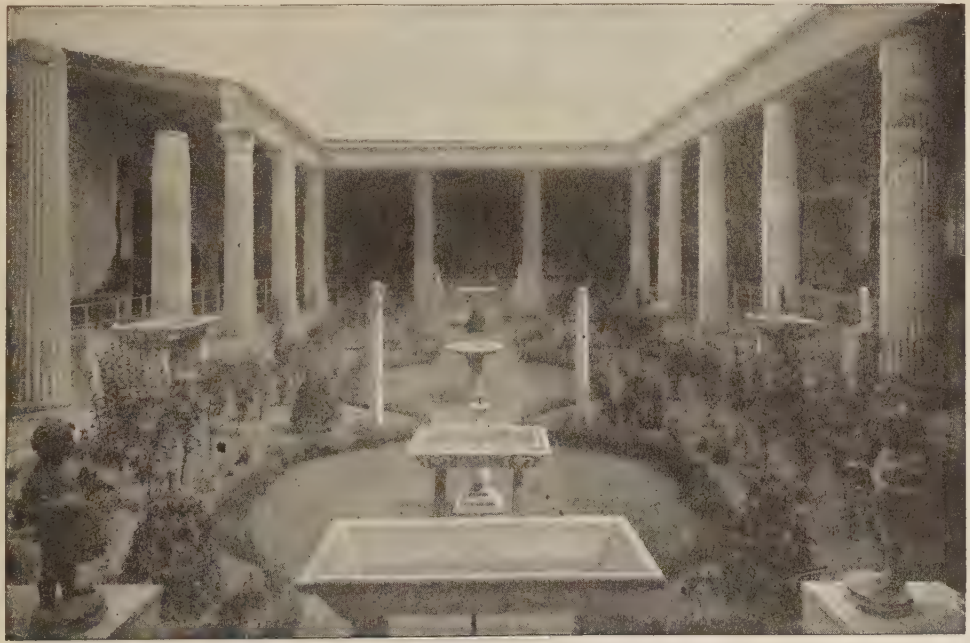
It is a distressing and depressing place, this city of emptiness and death. No hope can live here; nothing but despair can endure in these miles of ruin. The immortality of Pompeii is an immortality that no city need crave. It serves, in its death, to make prosperous the living city of Naples, for would so many come to Naples if it were not to see Pompeii and the Naples Museum?

But Pompeii is worth any discomfort; it is something to see in one of Life's Red Letter Days, and something never to forget, for no other work of man's hands has ever been buried in the earth and come out so wonderful.

CONTINUED ON PAGE 6217.

A POMPEII GARDEN THEN AND NOW

This shows the happy life in one of the houses of Pompeii. The children are playing with their mother in a court similar to the one seen in the lower picture. These courts, inside the house and quite separate from the outside garden, were laid out with shrubs, flowers and fountains, and adorned with sculptures.



One of the wonders of the world is the way in which Pompeii has been preserved, so that we can see much of it almost as it appeared two thousand years ago. Here is the open court of a house of the first century as it may be seen in the twentieth century. It is almost identical with its original appearance.

THE OLD NEGRO BASKET-MAKER

This old negro lives just outside of a town in North Carolina. Once he was a slave, and, after he was set free, worked on the farm of the former owner, until the latter's death. By accident he became a cripple but still makes a comfortable living by weaving baskets from strips of white oak wood. These baskets are used in the cotton fields and for many other purposes, as they are firm and strong and last a long time.

YOUNG WILD ELEPHANTS BEING LED CAPTIVE BY TRAINED ANIMALS

CONTINUED FROM PAGE 6048.

THE HUNTERS OF THE WILD

HOW THE ANIMALS CAME TO THE ZOO

WHEN we spend a day at the Zoological Park, in New York, and see the enormous number of animals, birds, and reptiles there, we cannot but feel that we have around us a little model of the whole animal world. Of course, there are still many species of animals and birds not represented, for there are many which it is impossible to keep alive in captivity. However, we have before us a collection drawn from all quarters of the world.

They have come from the vast spaces of Australia, from the jungle of India, from the sub-tropical forests of South America, from the rolling prairies of North America, from the burning plains of Africa, from the frozen North, from the little islands where it is always summer; they are taken from the wild highlands of Tibet, from the steep sides of the Alps, from caves and burrows, from the air, and from the sea.

Many of the animals, after their capture, have made long journeys on foot through the desert, have been carried in ships across the sea, and have been treated on their way with as much care and anxiety as if they were royal princes. There are many other zoos like the one in New York, not all so well stocked, but still good. There are several good collections in the United States and more than forty in Europe, to say nothing of private collections and a host of menageries.

To get together great families of animals such as these needs a world-wide system of hunting. We can see that this must be so when we look at the elephant, the rhinoceros, and the hippopotamus, with their huge bulk and terrible strength; the lions and tigers and leopards, with their savage natures, their strength, and speed; the bears, with their fierce, slow strength; the monkeys, with their agility and cleverness; the snakes, with their deadly powers.

Probably his own misfortunes first taught man how to capture animals more powerful than himself. The men of old times saw mammoths and other great creatures made prisoners by the marshes into which they wandered; and, desiring food, these men gathered their forces and attacked the imprisoned animals where they were. Then, having practised this for some time, they would learn to catch these animals by making traps for them, simply by digging a pitfall into which the creatures would fall.

To this day we employ this method for the capture of many of the animals which come to our zoos, particularly for the rhinoceros and the hippopotamus. Men often shoot the parent animals, and capture the young ones as best they can. But the methodical hunter lays his plans more deliberately.

As we already know, the mother hippopotamus, when she takes her young one out from home to drink at a pool, sends him on ahead, while she brings up the rear, carefully looking out for danger. The hunter gets to know the well-beaten paths in the reeds or grass or bushes leading to and from the water which the hippopotamuses take. He therefore digs a pit in the path and covers it over with boughs. The baby hippopotamus and the mother trot along, and suddenly, as the youngster puts his foot down, the earth seems to open under him, and he disappears from sight.

Now, if it were an open enemy which attacked her little one, the mother would charge with all her strength, but this disappearance is so mysterious that she turns round and bolts for home. The hunters come up, slip a noose over the head and front feet of the little one, then raise him from his prison, tie all four legs, and bind him up so that he can be carried away.

Much of the same plan is adopted for the snaring of the young rhinoceros, but here the difficulties are less, for the young rhinoceros is a better-tempered fellow than the other, and can soon be taught to follow his captors like a dog. A rhinoceros captured in Africa at once made friends with a tame goat, a vulture, a stork, and a baboon, and all the way down to the coast these friends were not to be separated. Especially was the young animal friendly with the goat, for it was upon the milk of this creature that it was first fed. The rhinoceros was taken to Germany, but the goat had to go with it, and when it was last photographed it had grown to be quite a big rhinoceros, while the goat was the proud mother of two kids, which lived with the rhinoceros.

Most of the lions which we see in zoos and menageries were captured when young, though many are born in captivity. They are not taken without a struggle, unless they are very young, for when only six weeks or two months old they make a brave fight for liberty. Therefore, the hunters generally throw a net or cloth over them.

If they are very young, they have to be reared by the kind attention of some other animal. For this purpose goats and kind-tempered dogs are used. Naturally, these animals are a little alarmed at first at the rough and fierce manners of their foster-children, but there is a marvellous power of friendship between a mother animal and baby animals, even if the baby animals are of a different order entirely.

The same practice applies to the capture of tigers as to that of lions. When full-grown lions or tigers have to be taken, it is a much more serious business. Many hunters make the old pitfall; then, when the animal has tumbled in, they lasso its feet and head, and throw a net over it. But often the animal injures itself in its fall, and dies.

The safer way, therefore, is to set a sort of gigantic mouse-trap. The door leading into the cage is held up by a spring. When the lion or tiger enters, and takes the bait, the spring is released and the door shuts down with a bang. Sometimes a lion, with more cunning than its fellows, suspects one of these traps, and, instead of walking into it, lies down and hides outside in waiting for the men who set the trap. One lion which was trapped got one of its paws shut in by the door, and when the hunters came up to secure the animal, it made a tremendous effort, burst open the trap, and, springing out, killed two of its would-be captors.

The same sort of trap serves for the leopard, the hyena, and the wolf, though the American master of craft, the wolverine, has been known to travel forty miles, stealing the bait from trap after trap set to catch it, and never once entering one of them.

The cheetah is one of the animals most commonly trapped in India, where the native princes keep packs of these animals for hunting. An interesting thing is that cheetahs, to be good

A DASH AFTER BIG GAME IN THE JUNGLE

THE HUNTSMAN, HAVING APPROACHED NEAR, MAKES A DASH UPON THE ANIMALS

Giraffes, zebras, elands, and other animals of this kind, always take to flight at the least sound. The hunter who wants to catch them alive has to be very cautious. He approaches them carefully, making no noise, and, keeping himself well out of sight till he is near, rushes out and overtakes the younger animals, that cannot run so fast as the older ones. It is the young animals that are wanted, as they will easily adapt themselves to a life of captivity, whereas the older ones are likely to die.

hunters, must be caught wild; those which have been born in captivity are worthless for the work. The natives have a peculiar way of catching these animals. Grown-up cheetahs are wanted, and the grown-up cheetah is the fastest runner in the world. Probably the fleetest thing on legs, next to itself, is the swiftest of antelopes. Should a cheetah see an antelope two hundred yards away, it runs with such amazing speed that it can catch the antelope before it has run four hundred yards. Luckily for the antelopes, the cheetah can run only for a short distance.

When wild, the cheetah, after killing an animal, retires to some secluded spot to sleep off the effects of its meal. When it is hungry, it goes to a place where many cheetahs meet, generally in the neighbourhood of some tree. The natives tie running nooses to this tree, and the cheetah gets its head fast in one of these and so is easily captured.

THE GORILLA IN A TREE
No man has ever caught a grown-up gorilla alive

When men set out to catch giraffes or deer, elands, and other animals from which little or no danger to themselves is to be feared, they approach very cautiously and quietly as near as possible to a herd, then suddenly dash out on their horses into the open in pursuit. Away go giraffes, zebras, and gnus, and gazelles, and antelopes in company. There are young ones with them, and it is these that the men capture. They really do not want the old ones, for they would be likely to die. Many animals do die in this way, from a mixture of fright and sorrow. The young of wild animals, however, are like children; though they may feel their griefs acutely for the time being, they soon forget the bitterness of their sorrow. The young ones are introduced to cows or motherly goats, which, after a few protests, give the little things all the milk they need, and so fortify them for the long march which they will have to make night by night, when the hot sun is out of sight, down to some seaport.

Men have caught species of nearly all the known apes and monkeys. Yes, even young gorillas and chimpanzees and gibbons have been taken. Hunters have never yet managed to take an adult gorilla alive, and probably never will, so fearful is its strength, so unyielding its ferocity. If they did, it would probably die by starving itself. Even the little ones cannot be kept alive, so homesick are they, and so delicate through the change of climate and of food.

Hunters find it easy to catch monkeys and baboons. There are all sorts of ways of catching monkeys, for they are great thieves, and will go wherever food is to be got. In India the monkey is sacred, because an old tradition tells that a monkey god helped to do a great work for the people of the country. Therefore, recognising that they are secure from injury, they become very bold, and are a real nuisance. Out in the wilds they have great battles, and fight in the natives' gardens, doing

WATCHING FOR THE WILD ELEPHANTS

The capture of wild elephants alive is a very exciting business, and months are occupied in preparing for the hunt. A great enclosure is built, and hundreds of natives, armed with rifles, drums, and firebrands, surround the haunts of the elephants, and, by frightening them with noise and fire, drive them into the enclosure, of which we see a corner in this picture. They are afterwards secured and tamed.

The driving of the wild elephants into the enclosure is watched by Europeans from a platform built in a tree. Any number up to a hundred elephants may be caught at one time in this way. When they have been in the enclosure some time, tame elephants, trained for the purpose, are driven in, and these occupy the attention of the captives while their legs are tied to tree-trunks by natives.

grievous damage to the poor people's crops. One wily native decided to punish the ring-leader of a swarm of monkeys which had injured him in this way.

He made a hole in the ground, and in it he placed a nice ripe banana. He concealed round the mouth of the hole the noose of a rope, which he hid in the sand. This rope ran through an iron ring which was attached to the trunk of a tree near by; and the end of the rope the native himself held as he hid and waited. Up came the monkeys, the bold old male leader coming out into the open, while all his wives and children remained for the time being hiding in the bushes. Ambling up he caught sight of the banana lying in the hole and grabbed at it. The native pulled the rope, and the noose closed round the arm of the monkey.

A good pull at the rope drew the monkey up to the tree where the iron ring was fastened. Then the native came out, and, walking round and round the tree, wound the rope round the monkey till he was securely fastened. The man then got a pot of soap and a brush, lathered the monkey, and shaved him. Then he released the monkey, who returned to his companions. They gazed upon him with amazement and disgust, fell on him and beat him, and drove him away. Their band broke up, and the man and his crops were left in peace.

Baboon-trapping is exciting. It is easy to catch the animals, but the danger comes when they have to be handled, for their bite is terrible, and their strength is almost beyond belief. The hunters block up all the drinking-places but one. Near this they construct a trap like a hut, with a spring door. This is left open for some time, and grain is scattered in and about the trap, till the animals look upon it as a sort of refreshment-room. Then one day, when many are inside, a hunter pulls the trigger, the door shuts down, and the baboons are prisoners.

But no man dares go in to secure them. So pronged sticks are thrust through the sides of the trap, and by this means the baboons are fixed, one by one, without hurt, to the walls of the hut, while their legs are secured. After they are thus tied, they are muzzled, and wrapped from head to foot in canvas, till they look like mummies. Very soon this treatment tames them, and they are placed in cages.

Elephant-catching is exciting and interesting. These great animals are so much used for work in India that it is necessary to make frequent hunts for their capture, because elephants are rarely born in captivity. There are four ways in which these hunts are carried out. There is the hidden pitfall, into which the poor creatures tumble, often injuring themselves badly. Another way is for brave natives to steal up to a wild elephant as the herd is running away, and to cast a noose round its leg. Then the rope is twisted round the trunk of a tree, so securing the runaway. A third plan is to pursue a herd, the hunter riding on an elephant, and casting a noose over any one that he can catch. This, however, is not satisfactory, for by this means only the slowest, and therefore not the best, animals are caught, and there is great risk of injury, not only to the fleeing elephant, but to that which is pursuing, as well as to its rider. The best-known way of capturing elephants is to surround a herd and take them all.

When food is scarce, a big herd of elephants will break up into several small groups, the several parties keeping a few miles apart from each other and coming together again when rains have made food plentiful. The hunters go out three months in advance of the time fixed for the actual attempt at capture.

The party of men numbers two or three hundred. Their work is to find out the groups of elephants, and gradually to drive them all together. The men make, as it were, a ring round that part of the country over which the scattered herds are distributed. All work toward one centre and to this the elephants are gradually driven. Generally the wild elephant will seek safety in flight rather than attack a man.

While the hunters are slowly working the elephants up to a certain point, other

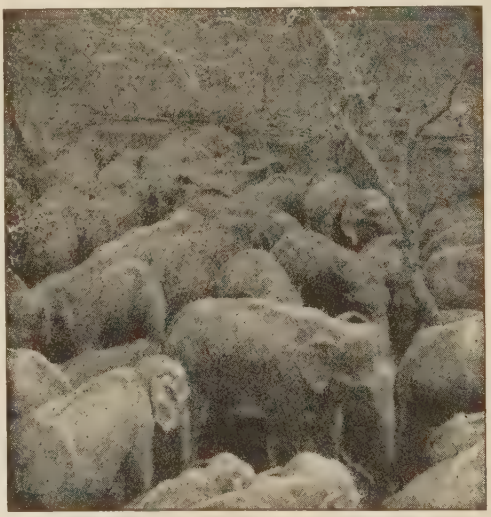
A WILD ELEPHANT BEING TIED TO A TREE

Tame elephants are very skilful in assisting hunters to tie captured animals, and they seem to enjoy the business thoroughly. They entice the captives near suitable trees, and all through show almost human intelligence. Here two tame elephants are leading a young wild elephant near a tree, while a man is about to get a rope round the captive's leg. Tame elephants often use their trunks to protect the men.

One after another the legs of a captured elephant are fastened to stout trees. The creature gets furious, but, after wasting his energy in pulling and trumpeting, is at last exhausted, and gives in. Then he is treated to luscious food, and gradually becomes tamer, until at last he can be untied. Here the elephant seen in the upper picture has given up the struggle, and lain down. When a wild elephant will not lift up a leg so the rope can be put round, the hunters tickle his foot with a leaf, and he at once raises it.

men are busy preparing a great enclosure. A space of ground is fenced round with a giant stockade, each piece of timber being the trunk of a strong tree. There is only one way into this — a narrow, funnel-shaped opening, which is closed once the herd has entered. At last, on the day fixed, the whole herd — males, females, and little once — is driven toward this entrance. So far the task of the hunters has only been to keep the elephants together day and night.

By day they fire their guns to keep them within certain bounds; at night they light large fires to keep them from breaking out of the ring. Now that the animals are at last in the fatal enclosure, the time has come for the *mahouts,* as the elephant-keepers are called, to show their skill. They could do very little were it not for the help given by the tame elephants, as will be seen in the following account of a capture.



A HERD OF CAPTURED WILD ELEPHANTS
Photograph copyright by Underwood & Underwood

A herd of wild elephants had been driven into a safe enclosure, and two tame elephants, bearing their riders, entered. One had been doing good service in captivity for over a hundred years. The other elephant, named Siribeddi, was about fifty years of age.

She entered the enclosure with a noiseless step, carrying two men on her back, and sauntered along with a simple air toward where the trapped elephants were. Every now and then she stopped to pluck a tuft of grass or a few leaves, as though she were engaged in the most ordinary work. The older elephant jogged innocently along behind. As the two tame elephants drew near, the wild ones advanced to meet them, and their leader put his trunk in a friendly way over the head of Siribeddi.

Siribeddi crept after him, and gave the man with the noose a chance to slip down and put it over the other elephant's foot. He saw the danger, and shook off the rope; then he turned to make a furious attack upon the man, who would have been killed had not Siribeddi driven back the attacking elephant.

The herd again formed a circle, and the two tame elephants pushed their way into the middle of the group, one on each side of the largest male, so that the three stood abreast. The male made no resistance, but showed his uneasiness by shifting from foot to foot. The man with the noose now crept up, and, waiting until the elephant lifted a hind foot, drew the rope tightly round it. The other end of the rope was fastened to Siribeddi's collar. When the noose had been fixed, Siribeddi instantly drew back, dragging the elephant with her. The old elephant followed.

The wild elephant had to be drawn backwards for fully thirty yards, struggling and plunging all the way. But Siribeddi knew her business. She walked round and round a tree, winding the rope round it, all the time holding it tight. With all her strength she could not draw the elephant close up to the tree, so the old elephant now approached, and facing him, head to head and shoulder to shoulder, forced him backwards. At every step Siribeddi drew in the slackened rope, and finally brought the wild elephant to the very foot of the tree. Then the man tied the second hind leg to the tree, after which the tame elephants placed themselves on each side of him, so the man could creep down and draw a rope round his fore feet, and he was a prisoner.

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Victor Hugo as a boy, writing an ode as he watches at night by his sick mother's bedside

CONTINUED FROM PAGE 6130.

VICTOR HUGO, A KING OF MEN

HATER OF TYRANTS AND LOVER OF CHILDREN

ONE of the great men of the time when our fathers were boys was Victor Hugo, the man with a mighty brain and a tender heart, who stamped his name for ever upon the memory of mankind. Let our first picture of him be that strange scene when he defended his own son.

Victor Hugo's son Charles had just as great a horror of suffering as his father, and so, when an execution in France, attended by distressing scenes, took place, the son wrote a stinging article of protest in a newspaper about it. The police locked him up for it, and he was put on trial. His father appeared at the trial, and defended him.

"The real culprit in this matter, if there *is* a culprit," said Victor Hugo, "is not my son. It is I myself, who, for a quarter of a century, have not ceased to battle against all forms of the irreparable penalty — I, who have never ceased to advocate the sacredness of human life." It was a thrilling speech which the great man made, but his son was sent to prison for six months. Victor Hugo's pen was always at the service of the criminal under sentence of death. He wrote to the British Government to save a man's life, he wrote to the Americans, he wrote to the Swiss Government. In the latter case he was successful, for the letter that he wrote was so powerful that Switzerland abolished capital punishment. With this thought of his battling for mercy, we may begin our story of Hugo's life.

Victor Marie Hugo was born at Besançon, France, on February 26, 1802. He came of a family which, long before, had been ennobled, but his father rose from the ranks, under Napoleon, to the position of general. Naturally he was a Republican. Hugo's mother, a dear, devoted woman, was a Royalist. The child inherited the strength and genius of both his parents, though he was a feeble child — so feeble, in fact, that at first it was thought that he could not possibly live. It was his mother's tender care which saved him, and he never forgot her great love, but celebrated it in after life in a beautiful poem.

Little Victor and his mother ac-

companied the military forces which his father led, and while he was still a tiny boy he travelled all over Italy on military expeditions, and once in an attack on some famous brigands. Then came two years of quiet study for the child under a good man named Lahorie, who had given offence to the Republican Government of France. Lahorie was captured and executed. The terrible event made a deep impression on the mind of the little Victor, and all his life he opposed this form of punishment. He turned for comfort to a sweet little maid named Adèle Foucher, of whom we shall hear later. His good mother blamed the French Government for the death of Lahorie, and the little boy came to believe that the execution was due to the form of government by which France was ruled. He, therefore, like his mother, became a Royalist.

VICTOR HUGO AS A BOY, WITH HIS TUTOR

General Hugo was a wise father as well as a good soldier; moreover, he was a loving husband, and not jealous that the child should adopt the mother's outlook. "Let us leave all to time," he said. "The child shares the mother's views, the man will have the opinions of his father." It was a true prophecy.

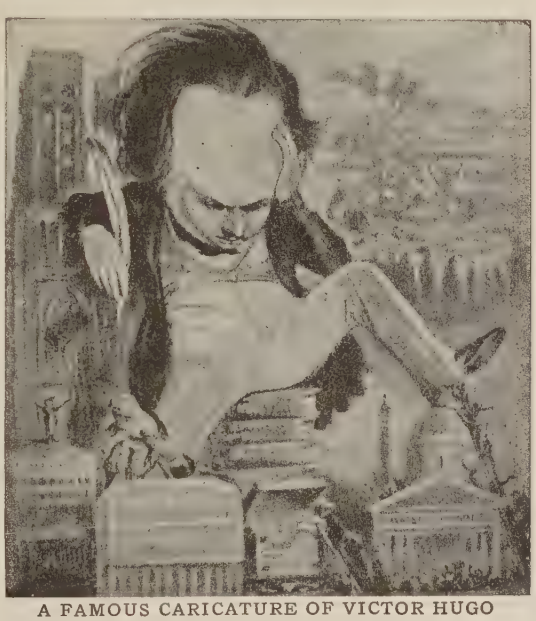
When he was nine years of age, Victor was sent by his father to a school in Spain, and there the genius of the child first blossomed. He began to write poetry at ten years of age. After a year in Spain, Victor went back to Paris, and spent three happy years studying under his mother's direction.

Great and terrible things had been happening in France. Napoleon, after rising to almost incredible power, had been defeated and had been sent a prisoner to the Isle of Elba — where Victor had spent some time as a tiny boy. Napoleon escaped from Elba, and returned to France for three months. In that time the battle of Waterloo was fought, and Napoleon was for ever overthrown. Had he not been beaten, we should probably never have heard of Victor Hugo. His father, thinking that war was to go on, as it had gone on for years before, decided that his son should be a soldier. Victor Hugo might have made a great general, but he would have been lost to literature.

After Waterloo Victor began to show his merit. Between the ages of thirteen and sixteen he proved himself one of the most wonderful boys that ever lived. He wrote every form of poetry known — verses, odes, satires, poems, tragedies, elegies, idylls, imitations of ancient poets, translations from the classics; he wrote fables, stories, epigrams, acrostics, riddles, and even a comic opera. When he was fifteen he competed for the prize for poetry at the French Academy — the highest honour that a French poet can gain. The judges did not know what to do with

his poem. It was extraordinarily good; but they simply could not believe that it was the work of a boy of fifteen. The subject set was "The happiness derived from study in every situation of life"—a very big subject. But here was the poem, and said to be the work of a mere child. They could not believe it. Victor sent up his birth certificate, but the puzzled judges seemed afraid to give him the prize, but gave it to another older poet, and merely awarded little Victor honourable mention. But he gained three prizes from the academy of Toulouse, and at eighteen was made a member.

Victor had two brothers, and with their help he now founded a newspaper. When he was nineteen his first great grief came to him, in the death of his mother. There was only one being in the world who could comfort him, and again he turned to charming Adèle Foucher, who, in the following year, became his wife.



A FAMOUS CARICATURE OF VICTOR HUGO

He sits above Notre Dame, the theatres, and all the varied life of Paris, of which he wrote; and the publishers are shown pouring out their money at his feet.

Hugo was only twenty; she was still younger. He had just published a book of poems, and received for it the sum of $175. With careless generosity he spent the whole of it upon a cashmere shawl for his bride, of whose wedding trousseau it formed the only item of importance. In the following year he wrote a strange, strong book, called "Han of Iceland." It was a sort of fanciful story, bearing upon his life up to that time.

He was now launched on his literary career, which lasted sixty years and changed the character of literature in France. He led, others followed, in breaking away from the old school of poets and writers. The poets had clung to the modes of ancient times, so that their writing was artificial and unreal. Hugo threw over the old forms in which poetry was written. He adopted new styles, suited to the character of the subject. He wrote of Nature, of human nature, and all the circumstances of man's life, ambitions, trials, temptations, victories, and defeats. In his novels he made as great a change. Here, however, he followed Sir Walter Scott, who was the father of the romantic historical novel. In the plays that he wrote, Hugo introduced new ideas also, but these were less important.

No great change can be made without arousing strong opposition. Some of his plays were suppressed by the authorities. Others caused such violent quarrels between their admirers and the critics that free fights took place in the theatres at which the pieces were played. Duels were fought over them, and in one a man was killed.

Hugo was not compelled to go on writing for the stage. Louis the Eighteenth had given him a small pension, so that he was not driven to write. Active as was his mind, even he felt at times indisposed to write; there were so many demands on his time. The day came, however, when it was necessary for him to tear himself away from the excitements of daily life. He entered into an agreement with a publisher to write a novel by a certain time. His way of doing it was remarkable.

He bought a thick grey worsted gar-

VICTOR HUGO VISITING LOUIS PHILIPPE
The author often visited the king, who once, the servants having gone to bed, escorted him to the door

ment, which covered him from head to heels; he sent all his other clothes to be locked up. Then he bought a big bottle of ink, and set to work. Friends found him out, and would drop in to hear him read over what he had written. They thought little of his work, and he thought of calling it "The Contents of a Bottle of Ink." But what do you think that book was? It was "Notre Dame," which has become one of the most famous novels in the world. It is a book for grown-ups; it is too serious and grim and tragic for children, but it is a wonderful piece of work, making the Paris of old, old times live again.

Hugo grew to think better of this book, for in later years he wrote two more volumes to follow it. One is "Les Misérables," and the other is "Toilers of the Sea." Together the three represent man's struggle in life with the forces opposed to him. The first shows the struggle against fanatical forms of religion; the second tells us of the terrible cruelty which civilisation may inflict; the third represents the everlasting struggle between man's will and the forces of Nature. The books are too deep for children.

Hugo passionately loved children. There is one of the most beautiful pictures of child life in his last great novel, "Ninety-three." It is a tale of 1793, a terrible year in the French Revolution, in which a war is in progress in the forests of La Vendée. In the forest there is an old castle, where are three lovely children, whose father is a marquis whom the revolutionaries intend to destroy. We see the little ones, happy, winsome little creatures, laughing and prattling at their innocent play, all unconscious of the horrors going on in the gloomy forest around their doomed home. Hugo paints in words a lovely picture of these three chil-

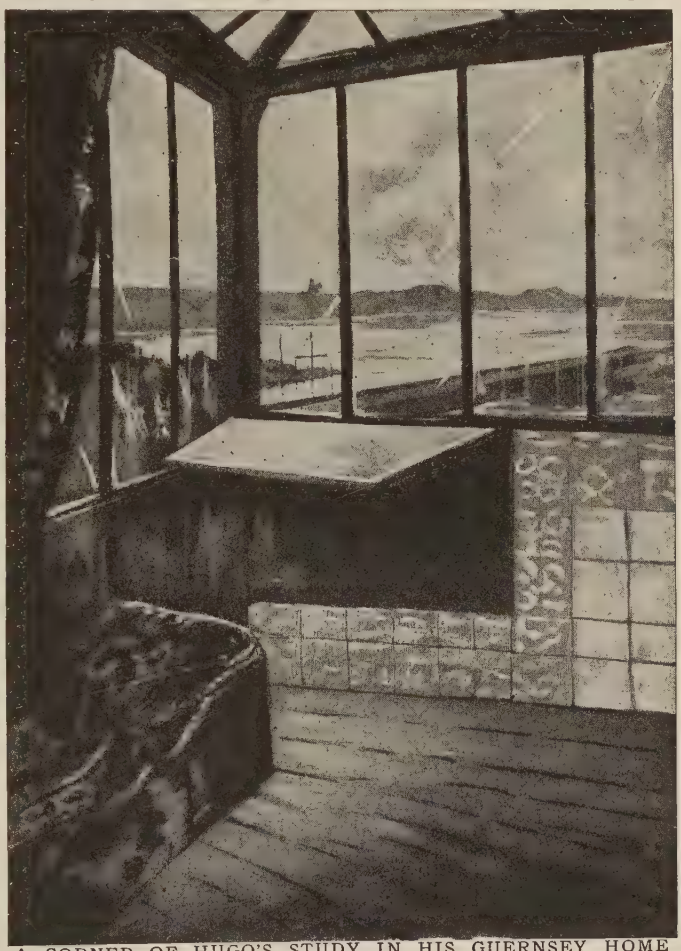
HUGO'S HOUSE ATTACKED BY COMMUNISTS
He had written vigorously condemning their deeds in Paris

dren. Georgette, a sweet little girl of less than two years, scrambles from her cradle and prattles to a sunbeam. The great lover of children says:

"What a bird says in its song, a child says in its prattle. 'Tis the same hymn; a hymn indistinct, lisping, profound. The child has what the bird has not, the sombre human destiny in front of it. Hence the sadness of men as they listen, mingling with the joy of the little one as it sings. The sublimest canticle to be heard on earth is the stammering of the human soul on the lips of infancy. That confused chirruping of a thought, that is as yet no more than indistinct, has in it one knows not what sort of artless appeal to the eternal justice; or is it a mute protest uttered on the threshold before entering in, a protest meek and poignant? This ignorance smiling at the Infinite compromises all creation in the lot that shall fall to the weak, defenceless being. Ill, if it shall come, will be an abuse of confidence."

Only a man who loved and understood children could have written that. Hugo loved all mankind. He hated wrongdoing, and had no pity for the powerful who did evil. He was receiving a pension of $200 a year from the king, and another pension of $400 from the Government, but this did not prevent him from attacking the king. Charles X. lost the throne in 1830, but Hugo's pension went on. Upon this people said: "Ah, you abuse royalty, but you continue to draw the pension which was given you by royalty." Hugo answered: "I accepted the pension as a tribute to my literary work, but, now that it is not so understood, I will never have it again." He was informed that the pension would be still at his disposal, but he always refused to accept the money.

The change which his father had predicted had now come about; Victor Hugo had become a Republican. In 1848 France drove another king — Louis Philippe — from her throne, and made herself a republic. Hugo spoke with ardour for Republican ideas. This brought him into conflict with Louis Napoleon, who had rushed to Paris, and got himself elected president of the new assembly. Louis Napoleon soon made himself emperor, as his uncle, Napoleon I., had done. Hugo was expelled from the country, and



A CORNER OF HUGO'S STUDY IN HIS GUERNSEY HOME
He wrote many of his famous books standing at the desk in this window

wandered from place to place, among others to Jersey, and to Guernsey, where he spent a great many years.

During his exile some of his greatest works were written. The French invited him to return to his native land in 1859, and again ten years later. He refused to return so long as Napoleon III. reigned. His admirers said that, had Hugo returned to France in 1869, so great was his influence that he would have been able to avert the misgovernment and ruin which descended on the land. In 1870 came the war between France and Germany, the defeat of France, the capture of Napoleon, and his exile to England, where he died. The Germans were besieging Paris when Hugo returned.

HUGO ENTERTAINING POOR CHILDREN TO DINNER
Every week the author used to invite the poor children to his house

Sorrows came upon Hugo. One of his daughters and her husband were drowned, and one of his sons died after a terrible illness. Still he was not left alone. Though he was the greatest writer and orator of France, he had many enemies, as such a man must always have. He retired into private life, and though he would occasionally write some powerful letter which would make all Europe talk, or appear in public to deliver some noble speech, he gave himself up mainly to his poetry, novels, and more serious writings.

With his surviving children and grandchildren he was happy and contented, always working and never weary. On his seventy-ninth birthday he was honoured as no king of France has been. More than 100,000 people, representing all classes of France, gathered in the Avenue d'Eylau, where he lived, to do him honour. All the most distinguished societies were represented, and in the midst of these great people a tiny girl, heading a procession of little children, was admitted to wish him many happy returns of the day. Victor Hugo died in May, 1885, mourned by the whole world. He is still beloved by grown-ups for the literary treasures that he left, and for his work.

Children loved him because he loved them. They think of him playing with his beloved grandchildren Jeanne and Georges; of his feeding the poor children of Guernsey twice every week, of his masterly skill in getting up Christmas parties for children. The house in which he lived in Paris is now a museum, to which lovers of his works delight to go. There are portraits of his children and grandchildren on the walls.

CONTINUED ON PAGE 6275.

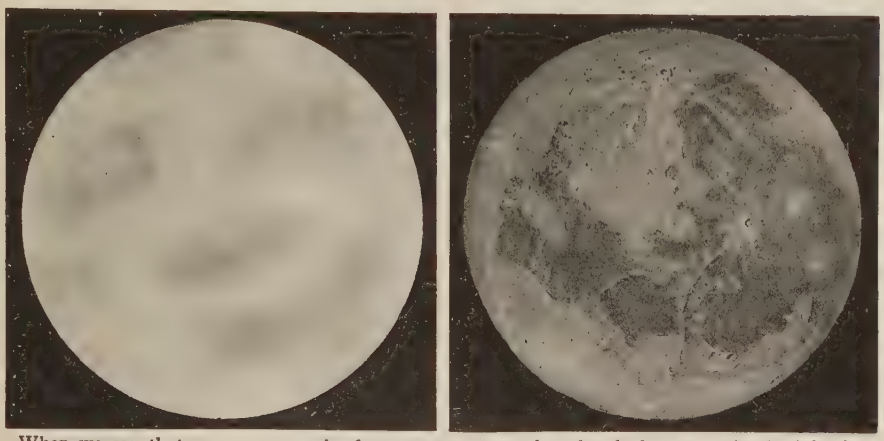
THE EXILE LOOKING TOWARDS HIS HOME

This striking painting shows Victor Hugo standing on the cliffs of the Island of Jersey, looking across the stormy sea towards the shores of his beloved France.

This picture, by M. Monchablon, is reproduced from a photograph by Messrs. Braun, Clement & Co.

A WONDERFUL NEW DREADNOUGHT

The growth of battleships goes steadily on. Here is a picture of one of the newer ships of the United States navy, the Utah. The Utah and her sister ship, the Florida, which is only just finished, are among the largest battleships in the world. She is 521½ feet in length, carries ten 50 caliber 12-inch guns and sixteen 50 caliber 5-inch guns, and has a speed of 21.8 knots an hour.



When we say that we see a man in the moon we mean that the shadows seen in the left picture look like the eyes, nose, and mouth of a man; but in the right picture, showing the moon through a telescope, our artist shows how we may get a much clearer image of a man in the moon by merely emphasising a few lines that really exist.

CONTINUED FROM PAGE 5962.

WHO IS THE MAN IN THE MOON?

FANCYING that we see faces or figures in the moon is rather like playing the game of pictures in the fire. At times we can certainly imagine that we see a great face in the moon, though we change as we grow older, and the writer of these words, who used to see the face very clearly when he was a child, has not seen it for many years — probably because he is looking for something else.

At any rate, there is no doubt that there are markings on the moon, and that in proportion to the moon's size they are very large, and many of them very high. We can prove that they are so by measuring the length of the shadows which they throw upon the moon's surface when the sun's light catches them sideways. These markings are partly what we must call mountains; they are partly, perhaps, in the nature of creeks, or clefts, and the most remarkable and beautiful of them look like craters of huge volcanoes. These are very large and have very high sides, as we can see when the sun shines sideways upon any of them. It is these craters, above all, that help us to see the man in the moon, or the little old woman gathering sticks, or whatever else people have thought they could see there.

There remains, however, a deeply interesting question which astronomers are now studying keenly. Are these craters really craters, and was the moon's surface really once covered with gigantic volcanoes? Some argue that things are indeed what they seem on the surface of the moon, and that the volcanoes are so big because the moon is so small. That sounds curious, but the explanation is that the moon, being small, would cool very quickly, and if it cooled very quickly and shrank very quickly its volcanoes would all be on a big scale.

But other astronomers are beginning to say that perhaps these markings never were volcanoes at all. They argue that the moon has no atmosphere to act like a great protective blanket or like the armour-plate of a ship, as our atmosphere does, and that the effect of meteorites, or shooting stars, falling upon the

moon would therefore be very serious. They argue that, at a certain stage in the moon's history, when its surface was much softer than it is now, pieces of rock, or whatever we like to call them, flying about in space and striking the moon at a tremendous rate might produce those effects which we now imagine to be craters. If this is true, the "marks" are not really craters at all, but are mighty scars, or holes, punched in the moon.

HOW DOES A GYROSCOPE WORK?

A gyroscope is very like a top. Indeed, it is only a very heavy and carefully-made top. It usually takes the form of a wheel with a heavy metal rim, and this is held or enclosed in such a way that if it is set spinning it can do so freely. Of course, any spinning thing tends to slow down, owing to the resistance of the air, and the friction where it is supported — unless, like the earth, it does not spin on anything. So by various means a gyroscope may be made to go on spinning, and then we can observe its behaviour in all sorts of conditions.

It has been learned by men of science that mere motion will give resistance and force and all the properties of hardness and rigidity to things which had not these properties before. This is true of the gyroscope. Its spinning motion gives it the power to resist very firmly anything that tends to alter the direction of its spin. The heavier the gyroscope, the greater will be the amount of motion in it when it spins, and the greater its resistance to any force that tries to alter the direction of its motion.

Therefore, a railway carriage may run safely on a single rail without tilting over, simply because it carries a spinning gyroscope, spinning so fast and made so heavy that its tendency not to be disturbed or tilted will prevent the carriage from tilting.

WHY ARE CHILDREN FOND OF DOLLS?

Some people have said that children are not really fond of dolls because they are dolls, but simply because they are possessions. These people declare that the secret is to be found in the liking which children have to possess things, just as grown-up people have the same liking, and that children will get quite as fond of anything that is theirs as of a doll.

But those who really know anything of children know a great deal better than this. They know that, as a rule, a child, at any rate during several years of its life, is far fonder of a doll than of anything else, and that the child is more pleased with the chance to nurse a real baby. So the truth is that the love of dolls is really the mother-instinct and the father-instinct showing themselves already, even in little girls and boys.

Often little boys are told that they should not play with dolls, but with soldiers. One little boy, who had not been taught such nonsense, had his doll out with him in the street, and some big boys cried out and jeered at him. But the little fellow had a good reply. He turned round and said, "None of you will ever be a good father."

WHY DOES A HEN CACKLE AFTER LAYING AN EGG?

Of course this is not an easy question to answer, for we cannot ask a hen why she cackles, and indeed, if she could speak, she could not give a reason; for this act, like many of our own, is not a reasonable one, but simply a consequence of the way in which a hen is made. It is what is called an instinctive action. Yet we can understand it because we can compare it with actions of other creatures about which there is no doubt.

The doing of anything which we were meant to do gives us pleasure. The bodies of living things are constructed in this way, as we might well expect. Now, pleasant feeling in ourselves and in other creatures often excites the body to some kind of activity, as when we say that a person sings for joy. When we feel very pleased with ourselves we want to sing, or whistle, or dance, or do some such thing. It is a question of what is called the expression of the emotions. A dog has the advantage of us in one respect, because it has a tail, and when a dog is pleased, it not only gives a special bark, which

is its way of singing for joy, but it also expresses its emotion by wagging its tail. On the other hand, an angry lion will sway its tail from side to side, and express its anger in that way.

So when the hen cackles after laying an egg, it is simply her way of singing for joy. Her body and her feelings have the satisfaction of having done something which her body is meant to do. It is probable that the actual laying of the egg causes discomfort, and there is a corresponding feeling of ease and satisfaction when the task is done.

WHAT ARE "BLIND-ALLEY" OCCUPATIONS?

A blind alley is a road along which one can go for a certain distance, and then no farther. We have to go back and make a fresh start, and we have lost all our time. And so we now give the name of "blind-alley" occupations — a name which every boy should know — to those which seem to offer a road to somewhere, but lead a boy nowhere, waste years which he can never regain, and perhaps even destroy his power to learn something better afterwards.

All who have studied the subject know how important this question is, and boys and girls should all be warned in time of the consequences of going into a "blind-alley" occupation. A boy leaves school at fourteen, and can at once get employment which brings in a few dollars a week, but which teaches him nothing. For instance, this may be the case with telegraph boys, as we all may see. After a few years, when the boy is beginning to become a man, and to expect a man's wages, he is, instead, turned off to make room for a younger boy. Since his "blind-alley" occupation has taught him nothing, and has only given him time to forget what he learned at school, he has to seek unskilled and poorly-paid labour, and often can get no work at all. Many scores of thousands of boys and girls in our country are now in these "blind-alley" occupations, and the time is come when we must put an end to a process which causes so much harm. It injures the boys and girls themselves, and it afterwards only too often makes them a burden upon the nation, instead of part of its real wealth.

WHY CAN'T LIGHT TURN A CORNER?

There are several ways in which light can be made to turn a corner, but it is true, and it is one of the most important facts about light, that it naturally travels in straight lines. This does not mean that the light from a lamp travels only in one direction. It travels equally in straight lines in all directions, and since it is a property of light to travel in straight lines, of course it cannot turn a corner by itself.

But fortunately there are many ways in which light can be made to turn a corner, for there are many ways in which rays of light can be bent or turned. By means of a mirror, or any surface which reflects light at all, light can be made to turn a corner, or any number of corners, so long as at each there is placed a reflecting surface. In just the same way, of course, a ball can be made to turn a corner.

Light can also be readily made to turn a corner by what is called refraction. This is the name given to the bending of a ray which in passing from one thing to another, as from air to water, or air to glass, becomes, as it were, cracked.

WHAT IS A CYNIC?

The word cynic is simply the Greek for *dog-like,* and means a person who has rather a snarling and dog-like kind of temper; at least, that is supposed to be the origin of the name. The great argument of the cynics in ancient Greece was that men must give up luxury and beauty, and even cleanliness, and any kind of decent human comfort. As we can imagine, they were not pleasant people, though it cannot be denied that they showed much courage and suffered much discomfort. One of the most famous of the cynics, pretending to be very humble, used to show himself in a cloak full of holes — a perfect instance of what has been called "the pride that apes humility." This particular cynic lived in the time of Socrates, who said to him, "I see your vanity peeping through the holes in your cloak."

WHICH IS THE BIRD WITH THE LONGEST TAIL?

We all know that the peacock's tail, which is so beautiful when opened out, is very long when it is closed up; but there are some birds in Japan that have tails as much as twelve feet long, and when they walk about in the open air special train-bearers support their tails, so that the feathers may not be dragged through the dust and dirt. These birds are a variety of the barndoor fowl. In the same way pouters and fantail pigeons have been developed in Europe from the common pigeon. The long-tailed cocks are reared at Shinowara, a village in the island of Shikoku. That they may not damage their tails they are kept in high, narrow cages, lighted at the top.

The bird naturally remains on the perch at the top, its tail hanging gracefully down. It is seldom allowed outside its cage, and then it walks in the open air for about half an hour, followed by its tail-bearer. Occasionally it is washed in warm water, and allowed to dry its feathers in the sun.

For travelling, special long, narrow boxes are used, and the feathers are bent as little as possible. The root of the tail in these birds is much stronger than it is in an ordinary cock. Even the feathers on either side of the body grow to an enormous length, and hang down with the tail feathers to a depth of three or four feet, so that the tail has the appearance of being not only very long but also very bushy.

A BIRD'S TAIL 12 FEET LONG

WHY DOES A LEVER MAKE A WEAK MAN STRONG?

In the case of all levers and pulleys the principle is the same. No form of lever or pulley makes power out of nothing. The secret lies somewhere in the special way in which the power is applied to the weight which it has to move.

If we think of a simple case of a man using a long iron rod to dislodge a piece of rock, by pressing the rod, near its lower end, against something firm, we shall see that the two ends of the lever — that is, the rod — move through very unequal distances in the same time. We can see this for ourselves by holding a pencil across the edge of anything, with nearly all the pencil on one side. Then, if we tilt it up and down, one end moves through a very much smaller distance than the other in the same time. The more unequal the two arms of the pencil, the greater is the difference between the distance moved by the two ends of the pencil.

That is what happens when a man is levering up a stone. He has not strength enough to move the lower end of the lever by pressing there, but he can get the necessary movement there by spending his power over a greater distance at the top end of the lever. Less power is required there, but it is required to act through a greater distance. So the work is done, and the law that power cannot come from nowhere holds good in this case as it does in all others, no matter if it does seem otherwise.

No man likes to meet a crocodile like this, but nobody fears to carry him in his pocket like this.

CONTINUED FROM PAGE 6112.

NOTHING LIKE LEATHER

STORED up in our popular proverbs is a vast amount of truth and sense, based upon the experience of men who have lived in all ages of the world's history.

According to one of these proverbs, "there is nothing like leather," and although we do not know who first made that statement, we do know that it is true. There *is* nothing like leather, and, though clever men have worked hard to invent a substitute for leather, they have not been very successful. The demand is ever growing and has always exceeded the supply. It comes from the skins of animals, and every bit of leather in the world was once alive.

Leather-dressing was one of the most important trades among the ancient Egyptians, and at Thebes, in the days of Egypt's glory, a special quarter of the city was set apart for the tanners. So great was the demand for leather that Egypt itself could not provide enough skins. One of the forms of tribute exacted from conquered nations was a number of skins, to be delivered every year for the making of leather by the skilled Egyptian tanners. In our museums we can see to-day splendidly preserved leather straps and belts used for binding round the mummies of men who lived far back in the days of Solomon. The mummies themselves, as they were carried to burial, were often covered with a pall or canopy of soft leather, dyed a delicate blue. The Egyptians used leather for making sandals, braces, belts, bags, shields, harness, sails, cushions, and chair-seats. From them the Israelites learnt the art of tanning, and, although the word leather occurs in the Bible only twice, there are many references to skins, which clearly mean leather.

The Greeks and Romans made leather, and indeed it is difficult to find any nation, ancient or modern, civilised or uncivilised, to whom leather has not been known. The most extraordinary things have been made of it. The Romans at one time had coins of leather, and some of the early cannon were made of leather.

In the making of leather from the rough skins of animals different processes are used, but they are all based upon the same principle, and are very similar. It is curious to know that the methods used by the Egyptians three thousand years ago are very much like the methods used to-day. Whereas in most other industries modern science and invention have

completely transformed the processes of manufacture, and made it possible to do in a tenth of the time, and with a better result, work that was formerly done by hand, in the tanning of hides and skins it has not been possible to hasten and improve the process so much.

An old mystery explained

The animals whose skins make the best leather are those living in hilly and mountainous countries, where they are exposed to great changes in temperature. They become hardy, and their skins are very tough. The skins of the big, fat cattle that we see in shows are of very little use for leather. Young animals provide better leather than old ones.

Before they can be made into leather the skins must be treated with lime, and a curious fact is that the lime used must have been used before for other skins. It was once thought that the lime itself, by some chemical action, loosened the hair. As a matter of fact, fresh lime tightens the hair in the skin. The old lime, owing to its contact with former skins, is full of bacteria, the tiny creatures that we can see only through a very powerful microscope, and these bacteria make their way down into the epidermis, destroying the roots of the hairs so that they come away easily. This fact explains for the first time the why and wherefore of a process that has been known and used for thousands of years.

The animals that give us leather

The skin of any animal can be tanned but the main sources of our leather supply are the oxen, sheep, goats, and pigs. A good deal of leather is now made from the skins of seals — not the fur seals, but the seals caught in the Atlantic Ocean.

The skins of crocodiles, lizards, snakes, and frogs are tanned for making small bags, pocket-book covers, and letter-cases. They are too horny for other purposes.

Horse-skin provides an excellent leather, much used for the boots of sailors and fishermen, because it is exceptionally waterproof. Porpoise leather is really made from the white whale, and is very strong. Elephant, rhinoceros, and hippopotamus hides make a very heavy and thick leather. The skins of sharks, buffaloes, antelopes, deer, kangaroos, wallabies, donkeys, and chamois are all tanned, but the supply is too small to make these animals of much commercial importance.

And this reminds us that the world is less and less able to get enough leather for its needs. Leather is what is known as a by-product — that is to say, the animals are reared and killed, not for their skins, but for their flesh; and as the skins happen to be there, they are used for making leather. But it would never pay to rear animals simply for their skins.

What will the world do for leather?

During the last twelve or fifteen years the price of some leathers has doubled, and other kinds cost half as much again as a dozen years ago. The uses of leather have increased also until we count them in hundreds. Leather is used for the great belts that drive our big machinery, and for the small buttons on a boy's coat; it is used for upholstering a motor-car or a carriage, and for making a purse or a watch-guard. The coming of motor-cars has greatly increased the demand, and many people of other lands who used to wear wicker sandals or wooden sabots now wear leather boots and shoes. So that far more leather is being asked for than can be produced.

The leather comes from animals that are killed for food; but people are now eating less meat than they used to eat, and the increase of vegetarianism and fruit diets is still further limiting the supply of leather. What is the world going to do for its leather in future? No one can say, but we know that as the demand increases, boots and shoes, balls, bags, book-bindings, motor-cars, belts, harness and saddles, purses, and a hundred other things made of leather, will become dearer.

CONTINUED ON PAGE 6203.

THE VERY BEGINNING OF BOOTS AND SHOES

The making of leather from skins of animals is an industry of ever-increasing importance. Here we see the well-equipped laboratory of a modern tannery, where chemists test the solutions used in tanning.

In addition to the skins of animals killed for food, large quantities of dried and salted skins come from abroad. They are first of all, as shown, put into pits of water containing chemicals to make them soft.

THE BIG DRUM AT THE LEATHER WORKS

After coming from the water-pits where they have been soaked, sometimes for days, the skins are put into a revolving drum, like that in picture, which contains chemicals, and here they are still further softened.

PREPARING THE SURFACE OF THE SKINS

It is necessary to remove the hair from the skins before they can be tanned, and to do this they are laid out on the ground, and covered with a mixture of lime, and then folded up and placed in pits for a time.

After the hair has been loosened by immersion in lime-pits, the skins are laid on boards, and the hairs and outer skin are scraped off with knives. This work needs skill. A man can unhair about 250 skins a day.

THE HAIR OF WHICH CLOTHES ARE MADE

The hair that is scraped off goat-skins is collected and passed through this machine, which dries it. It is then sent to the factories to be made into cloth for cheap clothes. Good goat-hair realises a good price.

The skins now pass through several processes of cleaning before being tanned. The machine in this picture takes all dirt out of skin, and removes any hairs that remain. It will clean about 3,600 skins a day.

HOW THE SKINS ARE TANNED INTO LEATHER

After cleansing, the skins are ready for tanning, in which processes vary. Pictures on this page show chrome tanning. It produces the strongest leathers. Here skins are being taken out of a drum of acid.

These men are putting the skins that came out of the drum into a second tanning bath. It will be seen that most of the men wear gloves. This is for protection, as the acid causes serious wounds.

SHAVING THE SKINS TO ONE THICKNESS

After being tanned, each skin is made of the same thickness; this machine shaves off all inequalities. It has to be worked carefully or skins would be damaged. The machine shaves nearly 1,000 skins a day.

Other processes follow, and the skins are then oiled. This helps to make them waterproof. They are next placed in ovens. In many of the processes no satisfactory machinery has yet been invented.

PREPARING TO GLAZE THE LEATHER

The skins, having been dried, are damped again by being packed in wet sawdust. These youths are very quick at the work, and can pack away as many as several thousand skins a day in the sawdust baths.

The next process is to pass the skins through a staking machine like those in this picture. The skins go through the machine twice, and, as a result, are rendered soft and pliable, and have the stretch taken out.

The leather is dyed, and before it can be glazed it must have one or more coats of seasoning mixture put on to make it take the glaze, and that is what these girls are doing. Women do this better than men.

"THE FIRST SHINE ON A PAIR OF BOOTS"

In the left-hand picture a skin of leather is being glazed by a machine which rolls a glass cylinder over it very rapidly, giving "the first shine on a pair of boots." On the right the skin is being trimmed.

Here the finished skins are being sorted according to their substance or weight. This work demands skill and knowledge of leather, and every man who attempts it must be a thorough expert at his trade.

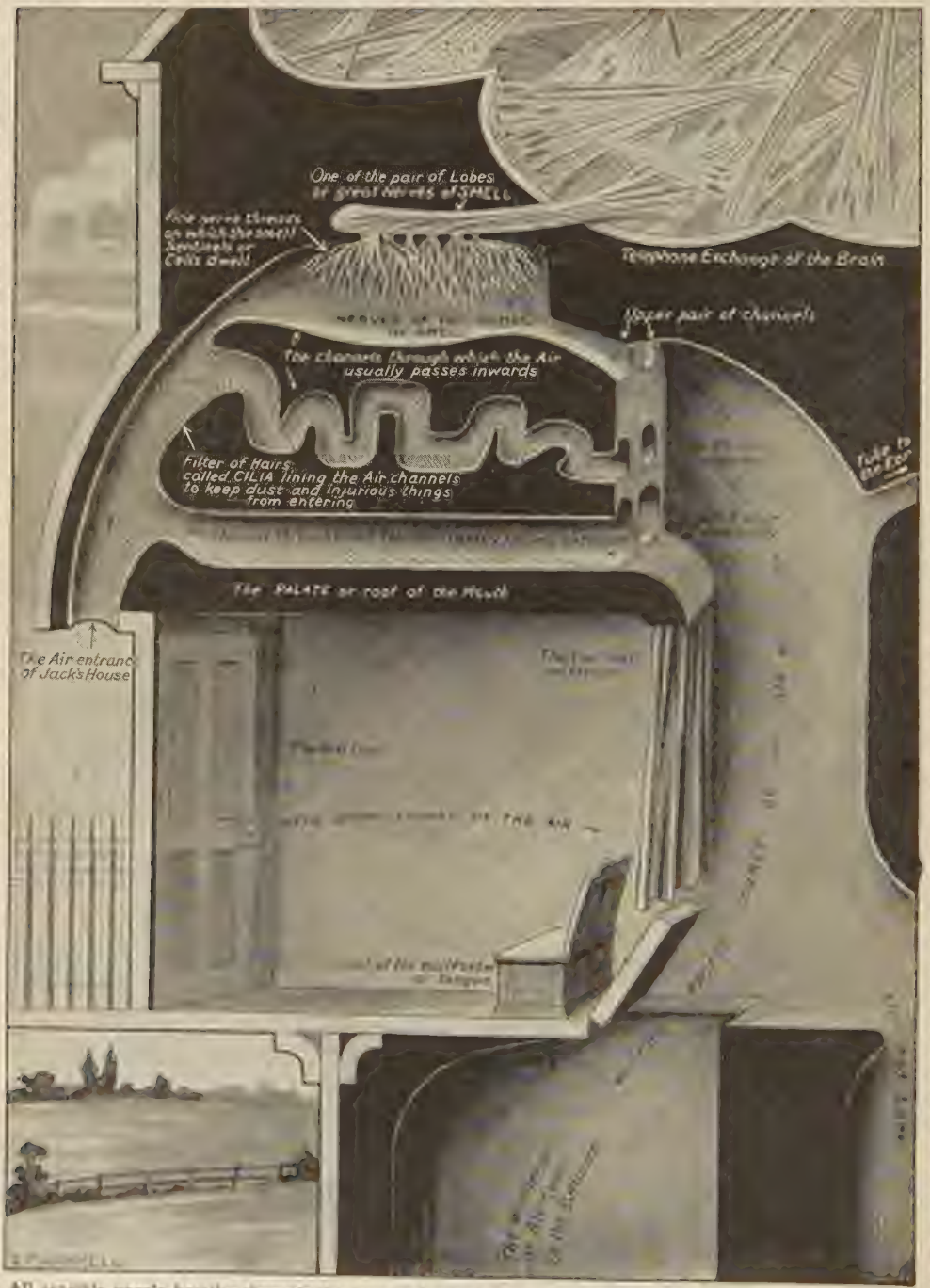
THE MACHINE THAT MEASURES THE SKINS

The skins are sorted according to colour, and as the shades vary the work of sorting is one that needs a skilled eye, and has to be done by the aid of a north light — that is, before a window that faces north.

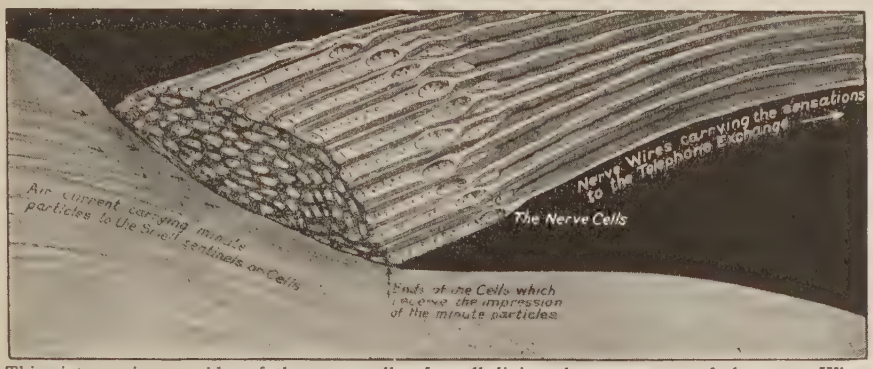
Before being passed to the warehouse for sale, the skins must be measured, as they are sold at so much per foot. This is done by the machine shown here, which measures more than two thousand skins a day.

CONTINUED ON PAGE 6203.

WHY WE MUST BREATHE THROUGH THE NOSE


One of the pair of Lobes or great nerves of SMELL
Telephone Exchange of the Brain
Upper pair of channels
The channels through which the Air usually passes inwards
Filter of Hairs called CILIA lining the Air channels to keep dust and injurious things from entering
The PALATE or roof of the Mouth
The Air entrance of Jack's House

All sensible people breathe through the nose and not the mouth, and this picture shows why. The little hairs lining the channels of the nose act as a filter, keeping back dust and other harmful things, and the value of this filter is lost if we breathe through the mouth, where dust and germs have free entrance into the lungs. This picture shows also the little cells which enable us to smell. When we smell a thing, small parts of it break away and touch the cells which live on the nerves of smell, and these cells can detect a particle of musk that weighs only a thirty-millionth of a grain, the sense of smell being more acute even than the eye aided by the microscope.


Air current carrying minute particles to the Smell sentinels or Cells
Ends of the Cells which receive the impression of the minute particles
The Nerve Cells
Nerve Wires carrying the sensations to the Telephone Exchange

This picture gives an idea of the nerve-cells of smell, lining the upper part of the nose. When we smell a rose a small particle of the rose is drawn to these cells, and the sensation is carried by the nerves to the brain, which recognises it.

CONTINUED FROM PAGE 6094.

JACK'S FRESH AIR SUPPLY

If the Architect of Jack's house had forgotten to provide for its proper ventilation the house could never have been built at all. The pity is that men are allowed to build any kind of houses without providing for the breath of life to flow through them; for Jack's house has to spend much of its time in houses built by men, and if they are not ventilated half the value of his own ventilation system is lost.

Jack's house needs air in order that his countless living servants may breathe. If we had said *burn* instead of *breathe,* that would have been an equally true saying, for we may look upon Jack's house as a wonderful furnace, which requires a draught of air if it is to burn properly. The fuel which Jack eats, and which his chemists cook so skilfully, would be of no use to Jack unless he had a supply of air to burn it with.

Burning means combining with air, and this goes on everywhere all through Jack's house, and all through the houses of all living creatures, animals, or plants, whether they live in the air or at the bottom of the sea. Therefore all living things require and have a ventilation system.

The centre of Jack's ventilation system is Jack's middle story, where are his bellows and his pump. But we must begin at the beginning, and we find that the air enters Jack's house through a special channel just above his front door.

The whole of the outside of Jack's body is more or less exposed to the air, but none ever enters through his skin, though a little does enter through the walls of ordinary houses. The living houses of some animals and plants are ventilated more or less through their walls. A plant breathes all over its surface, and a frog breathes partly by its skin. But Jack depends for his air supply entirely upon what enters his windpipe, the great air tube that runs down his neck into his chest, and if he cannot receive enough air through that tube he will die.

Jack's mouth, or hall, and his nose both lead to his windpipe, and air can reach it either through his hall door or through the two holes above it called his nostrils. If Jack runs hard, or swims hard, or if he has a cold, he is bound to open his hall door, and get air that way, but as a general rule air should not be admitted through the hall at all. Unless Jack has something to say, or something to swallow, his hall door

should be shut. The Bible rightly says that God put the breath of man's life *in his nostrils,* not in his mouth; and, indeed, Jack may well remember this very good rule — *Shut your mouth and save your life.*

It is true that it feels easier to breathe through the mouth than through the nose. Why, then, should the mouth not be used, and why is it actually dangerous to allow the hall door to be constantly open for ventilation?

Well, it is dangerous for many reasons, but one of them is easy to guess, for it is the very reason which often prevents us from opening our hall doors. Burglars may get in; and if Jack keeps his hall door open burglars will get in there too — microbe burglars which may smash and destroy his house. There are several other reasons, but we cannot understand them until we study those openings, and what is behind them.

THE IMPORTANCE OF THINGS YOU MAY NEVER HAVE THOUGHT OF

If we look at our nostrils we shall usually notice a number of fine hairs. They act as if they were a kind of grating or sieve, keeping back tiny flies or specks of dirt which might otherwise enter with the draught of air. Now, from the two nostrils right onwards until the air reaches the great lungs, or bellows, themselves, it has to pass one thing after another which, though we cannot see it or understand it so easily, plays exactly the part of those hairs.

When we study the inside of the nose, we find that it has various channels from the nostrils to the back of the throat, and instead of being straight they are most crooked and twisted, so that the air can never flow through the nose without striking against the inside of it, and having to go round corners. The inside of the nose is moist, and can readily be made more moist whenever the air is rather dry or cold. The nerves that govern the blood-vessels inside the nose see to that. Thus, not only is the nose crooked and moist, but it is also warm. Nor is that all. The moisture produced inside the nose by the chemists lining its walls is distinctly poisonous to microbes. It is to some extent an antiseptic, like carbolic acid, or the acid which poisons microbes in the food when they reach Jack's great oven.

What all this means we can only learn by very carefully catching some of the air which has been through Jack's nose, just before it reaches his windpipe, and comparing it with the air before Jack began to breathe it.

THE FILTER THAT SURPRISES THE CLEVEREST BUILDERS

If we do this — as we can do in a very wonderful way — we discover that Jack's nose is the filter of his ventilation system — a filter which does everything that can be done by the cleverest human builders, and vastly more. We can best prepare ourselves to understand and value this filter rightly by taking the best specimens of air-filters made by men.

At a well-known hospital there are rooms for performing surgical operations. All the air which enters them does so through a special shaft, which it can only reach by passing through a filter. Now, this air-filter is made of a great screen of hanging cocoanut fibres, down which water is always dripping. As the air passes between these dripping fibres, it is filtered of dust and microbes to a large extent, and is also moistened. If the water were warmed, the air would also be warmed by the filter. Then a fan drives it down the shaft and into the rooms, and there the people who breathe it all filter it again, if they are wise and well, by breathing through their noses.

HOW THE AIR WE BREATHE IS CLEARED AND MOISTENED

The nose is the great air-filter of Jack's house, and it does just what the filter does in those beautiful rooms. But the nose is a better filter than anything man can make, and it does more for Jack's house than the cocoanut fibres and the dripping water can do.

For when we compare the air taken from the back of Jack's nose with the air outside, we find, first, that the inside air contains no microbes at all, and practically no dust, except of the very tiniest kind; and we find, next, that it

is moistened, containing much more water-vapour than it did before; then we find, again, that it is warmed, for it has passed over a large surface lined with plenty of warm blood.

How wondrously this filter of Jack's excels all the filters made by men we shall see. To begin with, not only has air to enter through this filter, but it also has to return by it.

THE AIR THAT TRAVELS ROUND CORNERS AND THROUGH CHANNELS

No human builder can make such an arrangement as this. He must always have an inlet shaft, where the filter is, and an outlet shaft. At the hospital the inlet shaft sends the air straight to the patient's place, and the outlet shaft is near where the lookers-on are, so that nothing can travel against the stream of air from them to hurt him. But in Jack's house the inlet shaft and the outlet shaft are one and the same, which is unlike any other system of ventilation in the world.

Now, the inlet has purposely been made difficult so that the air may be filtered and moistened and warmed. It has to flow round corners and through narrow places, but it would be an inconvenience if the air had to do this in coming out. Therefore the lowest of the three channels which we find inside the nose on each side is practically straight and short; and we have discovered that practically all the air, on going in, travels through the middle and the upper pair of channels; but practically all, on coming out, travels by the lower pair of channels, though one pair of nostrils suffices for both purposes.

THINGS THAT WE NOTICE ON A VERY COLD DAY

This is really a beautiful discovery, for when first we study the shape of the inside of Jack's nose we cannot understand why the two upper pairs of channels should be so crooked and narrow, if the lower pair could let the air in. The fact is that, though the lower pair is open all the time, it and the others are just so placed that the in-draught is almost entirely through them, and the out-draught almost entirely through it. Further, if the upper and middle pair of channels are blocked, which too often happens, the lower pair still remains, and the air will do better to enter through them than through the mouth.

Indeed, this is an adaptable filter in every way. When the air is warm and moist, it is allowed to pass quickly and easily through the filter; but when it is cold and dry, and would do harm inside Jack's house, it is compelled to pass more slowly, and is exposed to more warmth and more moisture.

This beautiful arrangement is worked by those servants of Jack who sit in his upper story, and control, by nerves, the size of every blood-vessel in his body. When they get messages saying that the air is rather too dry and cold, they give orders to flood the lining of his nose with warm blood, by relaxing the walls of all the blood-vessels inside it.

THE FILTER THAT POISONS ITS ENEMIES

In order that this shall be effective, we find that the lining of Jack's nose is extremely loose on the bony walls, and so it can be stretched and filled with a great quantity of blood whenever it is feared that Jack is being supplied with air so cold and dry that it would injure the inside of his bellows.

We have seen that the inside of this filter produces something that poisons many microbes. When we blow our noses — which we should do more respectfully after learning what our noses are! — we clear the filter of a mixture of dirt, dust, and microbes; and if we consider how soon a used handkerchief becomes unpleasant, we realise what might happen to our lungs if we had no filter to breathe through.

But if we examine the lining of this filter with a microscope, we find still more wonders such as no other filter can show. Nearly the whole of its surface is covered with tiny living servants of Jack — cells which produce a steady flow of moisture to purify the air. These cells have a sort of hairs — called *cilia,* which is Latin for eyelashes — sticking out from them into the air-channel. These cilia are a sort of broom, which the cells that bear them keep brushing in one direction, so as to

keep the filter clean. Their action goes on night and day.

These ciliated cells line the whole of Jack's ventilating shaft, from the nostrils down to the bellows, or lungs, themselves. When Jack has a "cold," and especially when he has bronchitis, he loses the services of these excellent servants for a time, for multitudes of them are killed by the microbes that make Jack ill. Not until new ones take their place is Jack quite comfortable. One other interesting fact about these cells is that, like the white cells of the blood, which have wonderful powers of movement also, they are independent of Jack's officials in his upper story. No nerves order them about, and they move as they know they should, on their own account.

Very different are the cells which line one special part of Jack's nose, just where the incoming current is strongest. They are not merely connected with nerves, but are themselves nerve-cells.

THE SERVANTS WHICH GIVE JACK THE SMELL OF A ROSE

These servants of Jack are of a far higher kind than the cells which wave their cilia. They do not show, under the microscope, anything so wonderful as the "ciliary movement" of the other cells, but their power of feeling is really far higher and far more wonderful. When certain gases or particles of material come in Jack's air-current and reach these sentinels, they are known and recognised as good or bad, or as not mattering one way or the other; and this smelling, as we call it, is done by the smell-sentinels in Jack's nose, together with a special part of his brain, with a special kind of nerve-cells, which are experts at smelling, and can communicate with every other part of Jack's brain.

As a matter of fact, Jack's house is far from being as well supplied in this respect as the house of his dog. In human beings, the sense of smell has lost most of its importance, and the marvellous sentinels for seeing and hearing have taken the place of smell for most purposes — such as recognising Jack's friends and enemies.

Nevertheless, these sentinels that line the upper part of the air-filter are not to be despised, even though they are stupid in comparison with the smell-sentinels of many animals.

SENTINELS THAT MAY SAVE JACK'S LIFE

These little servants can still recognise many bad things. For instance, if the gas has not been properly turned off at night, Jack's sentinels tell him that it is escaping, for they recognise some of it in the air-current which passes them. But for this warning Jack might go on breathing the gas until it overcame the unsleeping cells that govern his bellows, and he would stop breathing for ever.

Also these sentinels give Jack much pleasure in the sweet scents of flowers in the country; and they are very useful in helping him to enjoy his food, for the scent of his food gets into his nose, and, indeed, a good deal of what he calls the taste of his food is not really taste at all, and should go, not to the credit of his hall-porter, but to that of the sentinels in his nose. The best proof of this is that Jack has a very dull taste of food when he has a cold, and the smell sentinels are drowned in fluid for a time, so that the smell of the food cannot reach them.

THE LITTLE TUBE OF AIR THAT HELPS US TO HEAR SOUNDS

Lastly, from each side of this filter there runs a tube which carries a little air to the inside of Jack's ear, so that there is air inside as well as outside Jack's ear-drums, and sounds can move them freely. This is called the Eustachian tube.

Such is Jack's filter. If it is not in good working order — as when part of the lining is overgrown and he has *adenoids* — he becomes a "mouth-breather," and suffers in many ways. No one can afford not to use this living filter, which stands at the beginning of the ventilation system, and without which Jack's house can never be as clean and habitable and durable as it should be. Yet most of us, when we talk of Jack's nose, mean the mere outside of this most perfect, most skilful, and most beautiful filter in the world.

CONTINUED ON PAGE 6251.

WHAT THIS STORY TELLS US

OUR forefathers travelled very little except when moving their homes. Many men and women lived their lives without ever going a hundred miles from the spot where they were born. Now people do not hesitate to go around the world for a vacation trip. However, as a larger and larger part of the people live in cities, many prefer to seek for their vacation scenes out of the ordinary. For the city-dweller Canada furnishes many new sensations. In the United States civilisation has reduced the wilderness to a comparatively small area. In Canada the population has been too small to do this as yet. Besides the works of Nature, man has done much that is interesting in this wonderful country.

THE AMERICAN TOURIST IN CANADA

THE summer season is regarded by many Americans as the bright spot in the year, when, for a brief space, the cares of business or professions are laid aside and life is given up to enjoyment. The increased facilities of travel make it more difficult every year to determine which place will prove the more enjoyable. During the past few years, Canada has been attracting more and more attention as a favourite summer resort for tourists from all parts of the world, and more especially from the United States. Every year finds Americans flocking in greater numbers to enjoy their vacation amid Canadian scenes. Time will only permit mention of a few of the numerous attractions that draw so many visitors to Canada.

KINGSTON, THE LIMESTONE CITY

A favourite place of entry for tourists is Kingston. The city is beautifully situated at the foot of Lake Ontario and at the head of the River St. Lawrence. It is a quaint, attractive place full of historic interest. It was once the seat of government. Kingston is the seat of the Royal Military College, Canada's West Point, and of Queen's University, an institution ranking with Toronto University and McGill. The massive grey stone forts, the Martello towers and the imposing public buildings all make the city very attractive. A steamer leaves daily for the Thousand Islands, Montreal and Quebec.

THE THOUSAND ISLANDS

The islands commence near Kingston and extend to Brockville, a distance of fifty miles. They number in all about seventeen hundred and present to the view of the passing traveller everything conceivable in the way of an island from a bare rock a yard across to an island covering many acres. They have already been described on page 5425. From Prescott to Montreal the trip is exciting and interesting. "Shooting the rapids," as the descent by boat is called, is a most exciting experience. Before us is a seething mass of churning waters, rushing with headlong speed down the rapids, which stretch ahead apparently without termination. Each moment we feel ourselves being further drawn into the mighty current and cannot help shuddering as the ship rushes at threatening rocks, but the skilful hand of the helmsman turns the boat aside and the rocks are passed without harm. The roar of the surges and the foaming spray that dashes over the boat intensifies the excitement caused by the swift undulating movement. Sweeping beneath the great Victoria Jubilee Bridge we come in full view of the city of Montreal, the commercial metropolis of Canada.

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MONTREAL AND QUEBEC

Montreal, the largest city, and the chief commercial centre, of Canada, attracts thousands of visitors. In beauty of location and in natural advantages Montreal is preëminent. It is not only the largest city in Canada but one of the financial centres of America. The city is the seat of McGill University, one of the leading institutions of learning in America, ranking with Johns Hopkins in medicine and with Columbia in science. There are many other colleges. The most important is Laval, a branch of the parent university at Quebec. In Quebec, Laval is to the French what McGill is to the English, and is one of the oldest institutions of learning in America, having been founded as a seminary in 1663, though, in its present form, it is much younger. From Montreal it is a night's sail to the historic city of Quebec, already shown on page 4100.

THE WASHINGTON OF THE NORTH

Steamers ply daily between Montreal and Ottawa, the capital of the Dominion of Canada. The city is beautifully situated on a high bluff overlooking Ottawa River. The government buildings, the chief attraction, form three sides of a vast quadrangle on an eminence one hundred and fifty feet above the river. A noted writer in describing them said that he knew of no Gothic purer of its kind or less sullied with fictitious ornaments and no site for such a set of buildings so happy as regards both beauty and grandeur. There are many other buildings of prominence, the chief of which are the Victoria Museum, the Canadian branch of the Royal Mint, and the University of Ottawa.

THE RIDEAU LAKES

The Rideau route from Ottawa to Kingston affords a trip of one hundred and twenty-five miles through the Rideau Lake region. This is an inland water course that is not surpassed for beauty and interesting features by any similar trip in Canada. The varied scenery, the refreshing climate and the excellent hunting and fishing are attractions that appeal strongly to the lover of nature.

KINGSTON TO TORONTO, THE QUEEN CITY

Toronto may be reached by rail or by boat but the tourist is likely to prefer the latter. A boat leaves Kingston every afternoon and the next morning at seven the "Queen City" is reached. The waters of Lake Ontario are as clean and as pure as a mountain spring. The lake is remarkably free from storms and is in high favour with all pleasure seekers who enjoy a delightful water trip.

Toronto, the capital of Ontario, and the second city in the Dominion, is situated on a large sheltered bay between the rivers Don and Humber. Its name is derived from the Indian De-on-do meaning "place of meeting." The beautiful scenery, the picturesque parks, the handsome public buildings, the beautiful churches, colleges and residences make it very attractive to the visitor and it is becoming a popular summer resort. Toronto is famous as an educational centre. Besides Toronto University, there are several colleges, the most important of which are Victoria, Trinity, McMaster, Osgoode Hall, Knox, St. Michaels and Wycliffe.

NIAGARA FALLS

The chief point of interest in all Canada is the world's greatest cataract, Niagara Falls. Boats leave Toronto several times daily and it is a trip that every tourist should take. Niagara Falls are situated on the Niagara River, twenty-two miles from Lake Erie, and fourteen from Lake Ontario. A few miles above the Falls the current becomes narrow and begins to descend with increasing speed until in the last three-quarters of a mile the descent is fifty-five feet, and the waters rush along very rapidly. On the brink of the Falls where the river turns at right angles from west to north the channel is divided by Goat Island, which occupies about one-fourth of the entire width of the river. To the right are the American Falls and the left the Canadian,

TWO IMPORTANT CANADIAN UNIVERSITIES

McGill University in Montreal was founded in 1811, by James McGill, a wealthy resident of Montreal. Since that time it has received large gifts, and has added many new departments until now it is one of the best equipped institutions in America. Many of the professors have a world-wide reputation, and no university outside the British Islands takes rank above McGill. The picture represents the oldest of all the buildings,—the home of the Faculty of Arts, originally a small foundation, but now on a level with the world-famous Schools of Medicine and Engineering.

The University of Toronto was chartered in 1827 as King's College, but was not opened for students until 1843. It received its present name in 1849. It has grown wonderfully since that time, and several other schools and colleges have been made a part of the University which now has many departments. Its reputation has increased with its growth in numbers. The picture represents only one of many buildings. This building is much admired, and no one who visits the beautiful city of Toronto, "The Queen City of the Lakes," should fail to see it as well as the other colleges and halls.

or Horseshoe Falls. Below the Falls, the river narrows to twelve hundred and fifty feet and rushes down, foaming and boiling, between lofty walls of rock. Three miles distant are the famous Whirlpool Rapids which in their way are as wonderful as the cataract. The immense volume of water is here forced to flow through so narrow a channel (about three hundred feet) that it actually assumes a convex form, the centre being twenty feet higher than the edges. At Lewiston, the river once more becomes wider and smoother. The Niagara Gorge Railway affords an excellent opportunity for seeing the beautiful parks on each side of the river and also the chief points of interest. You can see pictures of the Falls on pages 680 and 681.

THE PLAYGROUNDS OF CANADA

Toronto is the entrance gate of all the summer resorts in the Highlands of Ontario called the "Playgrounds of Canada." This district with an area of many hundred square miles lies along the eastern shore of Georgian Bay between the counties of Simcoe, York and Victoria on the south and Parry Sound on the north. The country is thickly wooded with pine, hemlock, balsam and maple, and is dotted with hundreds of pretty lakes of every shape and size. The larger lakes have innumerable islands, varying in size from mere grass-grown crumbs of land to those containing many acres.

The Grand Trunk Railway connects Toronto with Gravenhurst, situated at the foot of Lake Muskoka, the southernmost of the three Muskoka Lakes. From here boats make daily trips to all parts of the lakes.

For the hunter and the angler the district is a paradise. Deer, bear, fox and small game abound, while trout, bass and maskinonge are found in great numbers. The numerous small lakes and streams fairly teem with fish. To those in search of scenic beauty there is scarcely a spot to rival it; while those in search of health will find the purity of air and the general surroundings most beautiful. During the summer season more Americans than Canadians flock to the Muskoka region.

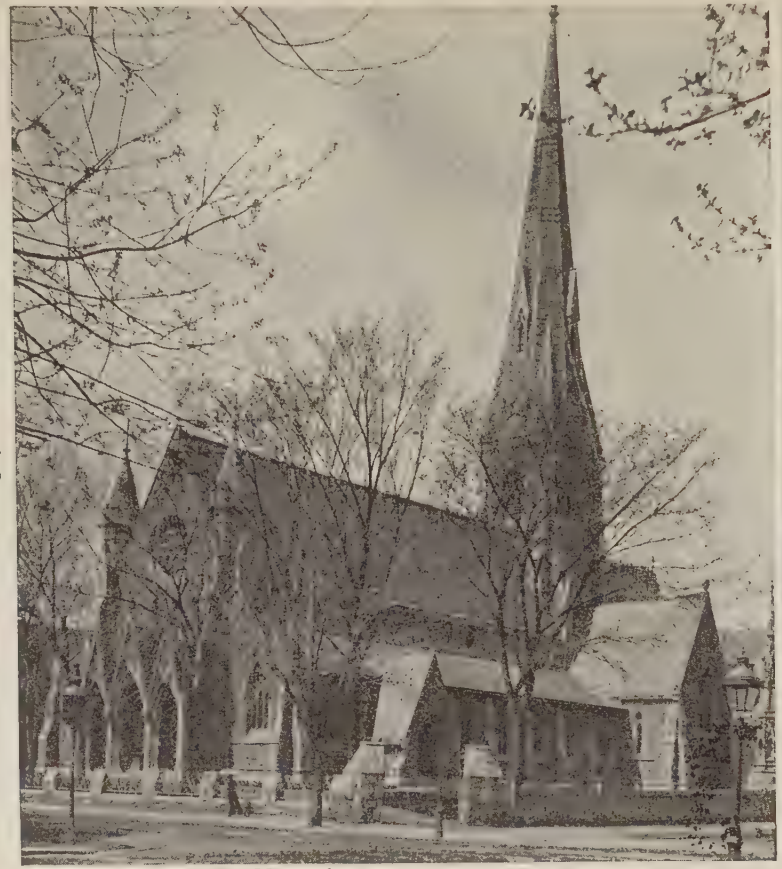
THE ALGONQUIN NATIONAL PARK

The park, the eastern section of the Highlands of Ontario, covers an area of two million acres of forests and water. A few years ago this vast tract was set aside by the Ontario government as a natural park. Twelve hundred lakes and streams are found within its boundaries. Unlike many of the other lake districts the waterways throughout the whole area of the park are continuous. Many of them are navigable for canoes from one to the other while others are connected by short and easy portages with trails blazed through the forest. The region has already won favour with a large number of travellers who are looking for new fields to explore, and for a place where civilisation has not yet encroached upon nature. Next to the scenic grandeur of the entire park, the main attraction is the fishing. The lakes, clean and deep, are filled with the black bass and salmon trout, while the streams are alive with speckled trout. There is no part of Ontario situated on as great an altitude as this territory. The atmosphere is pure and exhilarating. For a lover of nature there is no place better suited for a vacation. It is easily accessible by rail, and is also connected by stage coach with the Muskoka district.

TORONTO TO FORT WILLIAM

A favourite trip of tourists is that to the Pacific coast. The trip from Toronto to Owen Sound is by rail. There the tourist takes one of the Canadian Pacific's palatial steamers. The boat follows the west shore of Georgian Bay and enters Lake Huron through a channel opposite Cape Hurd. The crossing of the lake gives a delightful sail. Early the next morning the boat enters the beautiful St. Mary's River connecting Lake Huron with Lake Superior. The rapids by Sugar Island are passed and the boat turns to the left and enters the Sault Ste. Marie Canal to avoid the St. Mary's Rapids. It takes nearly an hour to pass the locks and

TWO IMPORTANT AND EFFECTIVE CANADIAN BUILDINGS



Photograph by Notman, Montreal.

From any elevated point in Montreal the frequency of church spires impresses every visitor. This is Christchurch Cathedral, the centre for the Anglican Church, in and around Montreal. It stands on St. Catherine Street, between University Street and Union Avenue. The cathedral was erected in 1859, and is an effective and pleasing example of Decorated Gothic architecture.

Photograph by Pringle and Booth, Toronto.

Few cities with twice the population of Toronto can boast a municipal building, so extensive and so imposing. The City Hall shown above was completed in 1899 at a cost of about $5,000,000. The central tower is 300 feet high, and affords an excellent view of the city. The building stands on Queen Street, not far from Osgoode Hall, which has been shown on another page.

WHAT THE TOURIST MAY SEE IN CANADA

During the winter the drifting snow sometimes buries the railroad tracks, or when the road is on the side of a mountain the snow slides down from above. For this reason, snowsheds are constructed to protect the tracks and enable the trains to run. Great snowploughs are also necessary to bore through or push away the snow.

Photograph from Brown Bros.

This is the interior of a snowshed, built to protect the tracks from drifting snow or from avalanches. Though it is through which the trains run safely, though it must be confessed that the passage is somewhat gloomy. The important fact, however, is that trains can run through the shed when otherwise they might be blocked.

Photograph by Notman, Montreal.

6188

THE GRANDEUR OF NATURE, EAST AND WEST

6819

Photograph by Notman, Montreal.

The Saguenay River is a deep cleft between rocks rising high above the water, which is generally hundreds of feet deep. About thirty-three miles from Tadousac, where it joins the St. Lawrence, Trinity Cape or Trinity Rock rises 1500 feet in three great steps. The picture does not show the top of the rock.

Photograph by courtesy of the Canadian Pacific Railway.

The Selkirk Range contains some of the most wonderful mountain scenery in the world, and no part of it is more fascinating than the Illecillewaet Valley, where the railroad follows the river valley, often crossing the stream, while the snow-covered mountains tower above.

just beyond is Whitefish Bay forming the southeast end of Lake Superior. The lake is the largest body of fresh water on the globe. It receives the water of over two hundred streams and contains numerous islands. The water is very clear and bitterly cold even at midsummer. The boat takes a northwest course and is soon out of sight of land. The following morning Isle Royale, a rugged rock-bound island, lying near the northwest shore of the lake, appears on the horizon. The boat passes between the island and the mainland, enters Thunder Bay and soon it has reached Fort William.

Fort William to Winnipeg

The passengers continue their journey by rail. Passing the station the train leaves the lake and enters a desolate rock-strown region. Few settlements are seen. After many miles the country becomes wooded and many lumber camps are passed. A few miles beyond Ingolf on the boundary between Ontario and Manitoba the country gradually becomes more and more level. Soon the train leaves the forest region of the east and is speeding over the great prairies of the west. A few miles further the road turns to the south following the Red River and in a short time the train stops at Winnipeg, the great Western metropolis, which has already been described on page 5366.

Winnipeg to Banff

From Winnipeg the road runs over flat and limitless prairies. Many towns are passed as the train speeds in through Manitoba, Saskatchewan and Alberta (see pages 4104, 4105). At Calgary, the tops of the Rockies are seen rising above the surrounding hills. Beyond the city the train ascends rapidly, twisting among the foothills, and following the course of the Bow River. The Rockies are entered through the Bow River Gap, where there is barely room for river and railway to pass side by side. A few miles more and Banff is reached.

Banff to Vancouver

Leaving Banff the train passes through one of the grandest mountain ranges in the world, one filled with the most varied and attractive bits of Alpine scenery. Here and there ribs of rock stand out like the frame of a mighty skeleton. Ice rivers drain lakes of snow nestling apparently in the clouds, and tumble in a wild confusion over rocky beds walled in by mountain sides. It seems all a dream and the passengers are not awakened until the train rumbles into Vancouver, described on page 5611.

Canada is going through much the same development as occurred in the United States thirty to sixty years ago or even less. In many respects the growth of Vancouver and Winnipeg reminds us of the wonderful development of San Francisco, Seattle and Chicago. The inrush of population into the great western prairies is like that which has taken place in the great states beyond the Mississippi since the Civil War.

Therefore, as one goes to and fro in Canada, he can see much of the history of the United States as his father saw it. Conditions in the United States have changed a great deal in a short period of time. Where a few years ago was unbroken prairie are now prosperous towns, thriving villages and even great cities. The same thing is taking place in Canada. The history of Canada will to a large extent repeat that of the United States, except that the Canadians have been wiser and are not squandering their resources so recklessly.

It is hard to find a country more attractive to the summer tourist. Those fond of social life can find it at the Thousand Islands. Those desiring fishing, canoeing and rambling through forests primeval will go to the "Playgrounds" or Algonquin Park, while those wishing wild mountain scenery and Alpine climbing will find their heart's desire in the Rockies. No wonder Canada is fast becoming the favourite resort for tourists from all parts of the world.

CONTINUED FROM PAGE 6080.

THE STONE IN THE ROAD

THERE once lived a king who ruled his subjects so wisely and so well that his fame spread near and far.

But everything was left by the people for someone else to do, and the king decided to teach them a lesson.

Now, it happened that one of the roads that led to the town passed through a hill. To this spot the king went late one night, and scooped a hollow right in the middle of the cart-tracks. Then from the folds of his cloak he took a small bundle, and placed it in the hole. Going to the side of the road, he loosened a large stone, which he carried to the hole he had made in the road. There he dropped it, so that it completely covered the opening.

Next morning a farmer driving his cart came that way.

"Ah," he cried, "the laziness of those people is terrible! Here is this big stone right in the middle of the road. I dare say it has lain there long enough for someone to have moved it. But no! everyone is too lazy to attend to such a simple matter." So saying, he pulled his horses to one side and passed on.

Presently down the road came a soldier. He sang gaily as he marched along; but his head was too far back for him to notice the stone, and in a moment he was sprawling in the roadway. He picked himself up, grumbling at people's carelessness, and walked on. But he left the stone where he found it.

By and by a company of merchants, with mules and pack-horses heavily laden, passed that way.

"This is a fine country!" said one. "I wonder how long that big stone has been lying there." But not one of them thought it worth while to move it out of the way.

Thus it went on day after day, week after week, and no one even attempted to move the stone. When three weeks had passed, and it still lay in the road, the king sent word to his people to meet him at this very spot.

"My good people and faithful subjects," he said, "it was I who put this stone here; and for three weeks everyone who has passed has blamed his neighbour for not taking it out of the road."

Then, stooping down, he lifted the stone, and showed them the hollow place beneath, in which lay a small leather bag. Attached to the bag was a label with the words: "For him who lifts the stone."

He undid the string which fastened the mouth of the bag, and a stream of bright golden coins fell to the ground.

THE WONDERFUL FRIENDS

A SHEPHERD lad was once sent by his father to carry food to his elder brothers, who were in the army of the king, encamped before a powerful enemy. When the young boy arrived, he found everywhere dismay and anxiety. For the champion of the other side had challenged any of their host to combat, and so mighty was he that none had dared to answer.

"Who is this man," inquired the shepherd lad, "that he should defy the armies of the living God?" He offered to go himself, and was brought before the king, and the king, after speaking to him, had him dressed in his own armour. But the lad said, "I cannot go with these, for I have not proved them." And he put them by. Then he took his shepherd's staff and his sling, gathered some smooth stones from the brook, and went out to meet the champion.

When the mighty warrior saw him, he was enraged, and cursed him in contempt. But the young patriot replied, "You come to me with a sword and a spear and a shield; but I come to you in the name of the Lord of hosts, the God of the armies of Israel, whom you have defied." And as the warrior bore down upon him he fitted a stone to his sling, and, whirling it about his head, let fly; and the stone struck full in the giant's forehead, and he stumbled and fell. Then the lad snatched the fallen hero's sword, and smote off his head. In an instant despair had changed to confidence and enthusiasm.

With a shout of joy, the army of Israel arose, and, flinging itself upon the enemy, drove them away in utter confusion.

Then the King of Israel inquired about the shepherd boy, but none could tell his name. "Inquire whose son the stripling is," he said; and presently the boy was brought before him, to answer for himself. "I am the son of thy servant Jesse the Bethlehemite."

Beside the king was his son, and this gracious young man, regarding the shepherd boy as he spoke to his royal father, felt his soul suddenly knit with the handsome lad's, and there and then loved him as his own heart. So he spoke to the king, and the king said that the lad David should no more return to his father's home, but should live with him in his palace, and be a soldier instead of a shepherd. And the king's son, Jonathan, took off his royal robe, and put it upon David, and gave him his sword, his bow, and his girdle. And he held David's hand, and looked in his eyes, and they made a vow together of a friendship which should last till death.

Life had changed utterly and completely for David in an instant. From living in a humble cot, he went to live in a king's palace. From being a shepherd of the hills, he was a captain of soldiers.

What dreams of glory must have crowded his brain! It seemed as if there was no height to which he might not soar, no fame he might not earn, no happiness he might not now enjoy.

In all the glory and honour which now invested him, there was one thing more gracious and more glorious than all the rest, and this was the deep love of the king's son. Clothed in such a love, as with a kingly robe, the young David was something more than warrior and hero.

What Julius Cæsar was to the Romans, what Napoleon was to the French army, this and more was David to the hosts of Israel. The spell of the man's *soul* was over the people, and in him they beheld a captain from heaven, whose right hand was terrible with victory. So, wherever David went with the army, triumph followed, and, on the return of the soldiers, the streets were loud with his name and with music to his honour.

In this glory of young David, Jonathan rejoiced with all his noble nature.

But the people shouted, "Saul has slain his thousands, and David his ten thousands!" And this cry pierced the king's chamber, and struck on his soul like the voice of Destiny. From that day Saul regarded David with other eyes.

Slowly it came to the mind of the king that David was his enemy. At first he had been envious of the praise showered upon his favourite; now he was suspicious. He regarded him as plotting for the throne of Israel.

to the nation that the king put away his suspicion, and said, "As the Lord liveth, he shall not be slain."

But, in a war that soon followed, David was again so successful that the king's suspicions returned, and, with his

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THE STONE FROM DAVID'S SLING STRUCK FULL IN THE GIANT'S FOREHEAD

He spoke about this idea to Jonathan and his courtiers, saying that David was dangerous to the royal house. But Jonathan, after he had warned David to lie in secret for a little space, went to the king and spoke so convincingly of David's honour and of his service

own hand, on a sudden impulse of hatred, as he sat with his successful captain, most basely the king sought to kill him with a javelin. Then David fled from the court.

Jonathan came to him in secret, and the two friends comforted each other.

Then Jonathan returned to soften the king's wrath against David. But when he spoke to Saul, the king this time burst out upon him with violent rage, bidding him see that he would never succeed to the throne while David lived; and admonishing him to throw aside a treacherous friend, and to protect his own interests while there was time.

To all this Jonathan replied, "Why should he be killed? What has he done?" And this gentle answer so enraged the king that he hurled his javelin even at Jonathan.

The king's son felt his soul suddenly knit with the soul of the handsome lad

Then Jonathan saw that it was in vain to plead, and unsafe for David to be within reach of his father's arm. So he approached David in secret, by a signal agreed upon by them beforehand, and David fell upon his knees, bowed his head to the ground, and waited for Jonathan.

Jonathan came near, took David into his arms, and they kissed one another, and wept together, till David was unmanned, and broke into tears.

Then Jonathan comforted the mighty conqueror, valuing his friendship more than life. "Go in peace," said he; "go in peace, because we have vowed, both of us."

Many years afterwards, when David, having gone through a multitude of adventures, was become a king himself, he heard how Saul and Jonathan had died together in battle. The news broke him down, and he cried out, "The beauty of Israel is slain!" Then the old friendship, with all its fragrance of innocence and youth, returned to him, and he said, "I am distressed for thee, my brother Jonathan. Very pleasant hast thou been unto me. Thy love to me was wonderful!"

One is quite sure that the last word uttered by the dying lips of Jonathan was the name of his friend, and that it went to heaven winged with blessing.

THE GREY TERROR

THE FIRST BOY WHO PLAYED WITH A DOG

AFTER Swar's adventure with the lioness, the men and women in the camp were very watchful over the son of their chieftain. He was never allowed to go out alone beyond the camp on Cornhill. It was not till the Grey Terror arrived that he had any more exciting adventures.

"Game is getting wonderfully abundant," said Wawa, one morning, late in autumn, to his wife Bina.

Only a few minutes before he had gone out hunting, and he had returned loaded with spoil. The river swamp was crowded with wild sheep and elk and horses and oxen and deer. That day the tribe got enough meat to last them till the winter months. Everybody was wild with joy, except Wawa.

"Something terrible must be happening on the south side of the Thames," he said that evening, as the tribe was eating round the great fire on the top of the hill. "I went down to the ford at Westminster. For a quarter of a mile the river is black with animals swimming madly across to the northern wilderness. They are all going north, and the tribe will have to go with them."

"Why?" cried all the men.

"I do not know why," said Wawa; "but I will soon find out."

He took his heaviest stone axe and his best stone dagger, and tied them round his waist. He then stripped himself of all his skins, and dived into the river, and struck out for the southern shore. None of the men and women of the tribe slept that night.

When morning came, there was no need for them to go out hunting. Herds of terror-stricken beasts came charging up the hill and sweeping through the camp, overturning the skin tents and scattering the tribe. Everything was in confusion when Wawa came limping up from the river. His stone axe and dagger were gone, and he was wounded in the leg.

"Don't trouble about the tents!" he shouted madly. "The Grey Terror is coming, and there is no time to escape! Out in the jungle for your lives, and get wood to make a great fire round the camp! Out, I say! Out, all of you — men, women and children — and collect brushwood!"

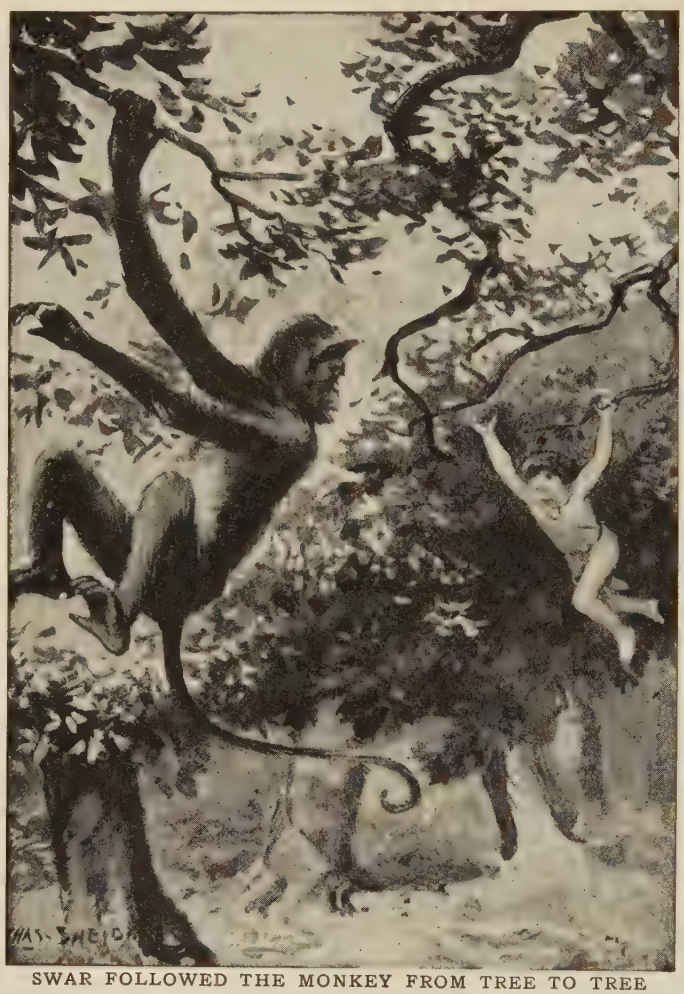
No one had ever seen Wawa look so terrible as he did then. No one dared to wait and question him. All the tribe rushed into the jungle, the children following their mothers, as Swar followed Bina. They helped to tear down the brushwood, while the men hammered with their stone axes at the smaller trees, or lighted fires at the roots in order to burn through the trunks.

At this awful moment Swar took it into his funny little red mop of a head to trot away into the swamp and see what was the matter with everything. Bina, of course, missed him, but thought he was with his father; while Wawa, who was limping round the camping-place and studying where to make the circle of fires, naturally fancied that his son was busy with his wife collecting wood.

All the jungle swamp was now empty of large animals. They had fled into the northern wilderness. Swar took the track towards Hampstead, which he had followed on his first voyage of exploration. The grey monkeys chattered in the tall forest trees as he passed by, and great long-legged storks, searching for frogs in the pond, slowly flew away at his approach.

"I don't know what I shall hunt today," said Swar to a monkey that was peering curiously at him from the lowest branch of a fig-tree. "Could you tell me where I could find the Grey Terror that daddy spoke of? I must kill it, because it is frightening mummy."

Swar thought that the monkey would understand him. It looked such a quaint human creature, as it peeped down at him, that he was sure it was some strange sort of child. By a stroke of wonderful luck, the monkey that morning happened to be in a mischievous mood. Plucking a large juicy fig, it threw the fruit at Swar, and struck



SWAR FOLLOWED THE MONKEY FROM TREE TO TREE

him plop! on the face. In the twinkling of an eye Swar had made up his mind. This grey, ugly thing which threw figs at you when you asked it a question was surely the Grey Terror, he thought.

He was up the tree in a minute. No man or boy of modern times could climb with the agility that this primitive little savage displayed. He was almost equal to the monkey at its own game. He followed it from tree to tree, never touching the ground once, but swinging from branch to branch, like a little human ape. Sometimes he stopped and nestled in the forking branches of a tree, and made a meal on nuts and figs. And there, in the tree beyond him, squatted the monkey, imitating his movements, and feeding on what he fed on. Swar kept chasing the animal till nightfall. By that time he was so tired out that he fell asleep over his last meal, and the monkey came and squatted beside him, high in a branching oak-tree, and put its hairy arms gently round the sleeping boy.

All that night there was a strange noise in the forest. Pitter-patter, pitter-patter it went on the leaf-strewn ground. Now and then the shriek of a rabbit was heard. And once, as the autumn moon shone for a moment the light from it fell on a vast, grey, moving mass, which was silently sweeping through the forest. A thousand glittering eyes instantly looked up, and the strange stillness of the jungle was suddenly broken by a loud, wailing cry from a thousand red throats. Then the clouds came together, and silence and darkness again fell on the forest, and the pitter-patter, pitter-patter noise gradually died away.

Swar was very angry when he awoke at daybreak, and found the monkey's arm around him. He had forgotten all about the Grey Terror, and he felt hungry and lonely, and he wanted to get back to his father and mother.

"I don't want to play with you," he said, as his strange bed-fellow began to gambol about the tree and chatter to him. "I'm going back to the camp."

He climbed down from the oak-tree, and set out to find the River Thames. As you can guess, he was a good distance away from Cornhill. Happily, his father had taught him how to guide himself by the position of the sun, and after a tramp of four miles he came to

the shore of the Thames at the place where Chiswick now is.

"Now I know my way home!" he said joyfully.

And, turning right to the east, he trotted along the river-bank towards Westminster. Of course, there was no path along the river in those distant days. The land was covered with a dead undergrowth, broken here and there by irregular tracks made by the woolly elephants and the huge buffaloes as they went down in herds to water to drink. At Westminster, where the Thames shallowed, all the jungle for about half a mile had been trampled down flat by the huge droves of terror-stricken beasts that had fled before the Grey Terror into the northern wilderness.

As Swar was passing over this strange place, a little animal came out of a muddy tuft of reeds, and began to follow him. Swar did not notice it until it licked his bare legs, and made him turn round with a start. He had no weapon, and he gave a cry of fear, and ran away as fast as he could. The little animal easily overtook him. Instead, however, of trying to hurt him in any way, it ran by his side, and attempted to play with him. Swar at last stopped, and looked at him in a friendly way.

"You're a funny little thing," he said. "You're like a young wolf-cub, but your grey fur is finer and softer, and you're not a bit fierce."

It was, indeed, only a frolicsome little puppy-dog. Swar found it a delightful playmate. They chased one another in turn from Westminster to Cornhill. Panting from the exercise, and wild with delight over his new pet, Swar rushed up to the camping-place of the tribe, and shouted and capered outside the circle of burning wood.

"Joy, joy, joy!" cried Wawa. "Swar is safe! Beat down the fire, men, and let him in!"

Men, women, and children hastily caught up whatever was handy — skins, sticks, and stone spears — and raked some of the burning wood away to make an entrance for the little boy. Bina and Wawa rushed forward to embrace him, but the little puppy-dog got through first, and rushed towards them, barking loudly out of sheer excitement.

"The Grey Terror — the Grey Terror! It is upon us! The river! Jump into the river! It is our only chance! Oh — oh — oh!" shouted all the tribe, in a madness of fear.

THE LITTLE ANIMAL TRIED TO PLAY WITH SWAR

They leaped through the line of fire at the water-edge, in a wild, confused, and swift movement. Only Wawa remained behind. Lifting up his great stone axe, he sprang to the opening made in the fire circle, shouting:

"Run with your mother, Swar! There is still time. I will keep the Grey Terror back while my life lasts!"

Swar took his little puppy up in both arms, and began to run to the water as fast as his little legs would carry him.

"Kill it, boy! Kill it!" Wawa shouted to his son. "That is one of the Grey Terrors you are carrying!"

Swar stopped running in blank surprise, and looked first at his father, and then at the puppy. The little dog began to lick his face. In the meantime, Wawa had turned, and he was now gazing, open-mouthed with astonishment, at the empty jungle stretching from Cornhill to Walbrook. He had expected to see a vast, grey, surging mass of fierce beasts charging up the hill.

"This is one of them — a very little one," he said at last, going up to Swar, who was sitting on the ground, clutching the puppy as tightly as he could. "But the great herd of the Grey Terror seems to have swept northward on the trail of the forest cattle. Where did you find this little beast, my son? Wow-wow-wow! How playful and friendly the little Terror is!"

Wawa patted the puppy, and it licked his hand, while Swar was telling his father his adventures with the monkey, and his finding the dog.

"It was well for you, my son," said Wawa gravely, "that you slept last night high in an oak-tree. The Grey Terror came sweeping up to our camp early in the evening, and even with a double line of fires we had trouble in beating them off.

"They must have passed you in the darkness when they turned north. Yes," he added, as Swar looked up to him with imploring eyes, "you can keep your little grey beast as a playmate if you like. At least, unless he grows fierce and dangerous."

And that was how Swar came to be the first human being who had a faithful dog to help him when he went out hunting.

WHY THE SWALLOW BUILDS ON THE WALL

In the days of long ago, when the first swallow skimmed lightly over moor and meadow, she was very proud of her pretty plumage and her long, forked tail. Indeed, she became so vain that she could think of nothing but how best to show herself off before all her feathered friends. So it came about that she quite forgot how to build a nest.

After trying in vain for a time, she decided to ask help from some of the other birds. She went to the thrush, for she thought she looked the most good-natured, and asked her help.

"I will show you gladly," said the thrush. "First, you take some of these old grass stalks."

"Yes," said the swallow.

"Then take a lump of clay," went on the thrush, "to plaster them."

"Oh, yes, I know!" broke in the swallow.

"Plaster them exactly like this."

"Yes, I can do that all right."

"Then you turn it up like this."

"Oh, yes, I know!" again said the swallow.

"And then you ——"

But before the thrush could add another word the swallow interrupted again.

"I know," she said; "of course."

This made the thrush angry.

"Well," she said, "if you know so much, why do you come bothering me with your questions?"

So saying, she flew away to look after her eggs.

Only half round the nest had been built, and the swallow, thus left to herself, could not make out how to finish it. She tried again and again, but all in vain. So she stuck the side she knew how to build on a wall, and made it do.

And thus it is that the swallow, through thinking she knew more than she did, has only half a nest to this day.

THE PALACE OF PEACE AT THE HAGUE

Soon after the first conference to discuss the possibility of putting an end to war, which met at The Hague, the capital of the Netherlands, in 1899, Andrew Carnegie announced that he would build a permanent home for the conference and the Court of Arbitration appointed to sit there. The building has just been completed at the cost of more than $1,500,000.

6619

STORIES TOLD IN INDIA 3,000 YEARS AGO

THE BLUE JACKAL

A JACKAL, prowling round a town one night, fell into an indigo-tank, and came out dyed blue.

"No one will know me now that I am this splendid colour," said he, "so I will pretend that I am king of all the beasts."

He began by ruling over the jackals, and then the lions and the tigers submitted to him. This made him proud and insolent, and he no longer took any notice of his old jackal friends.

One night they gathered round the self-made king and began to howl, and so soon as the blue jackal heard the others yelling, his natural instinct led him to do the same, and at once all the other creatures in the jungle knew him to be nothing better than a jackal, and he lost for ever his crown.

Silence is sometimes golden.

THE TRAVELLER AND THE HERON

A WEARY traveller lay down to rest under the shadow of a fig-tree and went to sleep. In the tree lived a crow and a heron, and the heron had often been warned he would come to a bad end if he kept company with an evil crow.

As the sun shifted, so the shadow of the tree moved away from the traveller, and he was left exposed to the sun. But the heron, seeing this, felt sorry for him, and spread out his wings and shaded the weary traveller. The evil crow, however, laughed at the heron, and then, to annoy the traveller, dropped a stone upon his face and flew away.

When the traveller, smarting from the sting of the stone, jumped up and seized his bow and arrow, he saw only the heron in the tree above, and, thinking that this was the culprit who had thrown the stone, he fitted an arrow to the string, and fired and killed the heron.

Avoid evil companions or they may lead you into serious trouble.

THE CROWS AND THE ANKLET

A PAIR of crows lived in a hollow tree, and there also lived in the bottom of this tree a fierce snake that used to eat the young of the crows as soon as they were hatched.

The next day when the son of the king came down to the river close by to bathe, the male crow flew down, and, seizing a golden anklet that the prince had removed and laid on the bank, he flew away with it and dropped it inside the hollow tree.

Of course, as soon as the king's son came to the bank again after bathing and put on his clothes, the anklet was missed. There was a great hue and cry, and every place was searched for the missing jewelry. At last the anklet was found in the hollow tree, and the serpent was also found by the prince's attendants, who instantly killed it.

Skill will make up for lack of strength.

THE ELEPHANTS AND THE MOON

IN a time of drought a number of elephants were hard pressed to find water for themselves. But at last they discovered a pool, near which lived a colony of hares, and in going to and fro the elephants used to trample upon several hares every day. At last the matter became so serious that a meeting of the hares was held, and, after a good deal of discussion, an old hare undertook to make the elephants cease using the pool.

Standing upon a hillock, as the elephants approached, he said to their leader:

"Sir, I am an ambassador from the moon, who wishes you to know that this is his pool, and that the hares whom you are driving away are its guardians."

"We know nothing of this," said the elephant.

"Well, if you come here to-night, you will see the moon in the pool, shaking with rage."

The elephant went. He saw the reflection of the moon, which quaked as the water rippled, and in great fear he promised that the elephants should trespass on the pool no more.

Superstition often causes those who are mighty to tremble.

CONTINUED ON PAGE 6305

THE ROBBER AND THE MONK

A MONK who belonged to one of the monasteries near Paris used to travel from village to village in the neighbourhood collecting money for the support of the monastery. One day, when he was returning home through a wood, a robber suddenly stepped in his path, and, presenting a pistol, demanded that the bag of money should be handed over.

The monk saw that he would lose his life if he resisted, so he gave the robber the bag, asking only one favour in return.

"What is that?" said the man.

"Well," replied the monk, "when I get back to the monastery, I don't want my brethren to think I tamely gave up the bag of money without making a fight, so I am going to hold out my cloak, and I want you to fire a bullet through it. Then it will be clear to my brethren that my life was really in peril."

The robber fired, but the monk could see no hole made by the bullet, and expressed astonishment.

"Ah!" laughed the robber. "That is not surprising, for I will tell you in confidence that I never load my pistols with bullets; I simply fire off gunpowder, and that is sufficient to make any traveller give up his money."

"Really!" answered the monk; and with that he sprang suddenly upon the robber, and recovered his money.

THE MAN WHO BROKE THE NEWS

THE son of a country landowner went to Paris to study at the University, and, after he had been there some time, he was astonished one morning to see an old manservant from his father's house.

"Why, what is the matter?" said the young man.

"The cat is dead," was the reply.

"The cat dead! Why, what did the poor animal die of?"

"Of indigestion, through having eaten too much meat."

"Too much meat! Where did the meat come from?"

"From your poor horses."

"The horses! Are they also dead, then?"

"Yes, the poor animals died from exhaustion, through having to carry so much water."

"What was the water for?"

"To put out the fire at the house."

"The fire at our house?"

"Yes, it caught light through the maidservant forgetting to put out the candles."

"What candles do you mean?"

"Why, the candles used at your father's funeral."

"My father's funeral! Do you mean to say my father is dead? Why did you not tell me at once?"

"Well, I was told to be sure to break the news to you as gently as possible."

THE PAIR OF NEW BOOTS

A FRENCH soldier who was serving with his regiment in Algeria wrote home to his old father asking that a new pair of boots might be sent to him.

The father went to the village shoemaker's and bought a pair of strong boots, and then asked one of his acquaintances how to send them.

"Oh," said he, "you had better telegraph them."

"But that will cost a great deal of money," replied the old man.

"Oh, no," said the other, "it will cost you nothing. All you have to do is to take them out into the open country and hang them on the telegraph wire."

The old man decided to follow the advice, but hardly had he departed when a beggar, who had noticed the performance, went quietly, and, taking down the new boots, hung up his old and ragged ones in their place.

The father, feeling curious as to whether the boots had gone, went out of the village to see.

"Bless my soul," said he, "this telegraph is a wonderful thing. Here, for nothing, I have been able to send a pair of boots all the way to Algeria."

AN ARTIST'S DREAM OF A CITY OF MARS

In this picture the artist has shown us the wonders of a Martian city as he imagines it. We see the mighty canals extending in all directions, with the boats of the Martians moving upon the waters, and the broad landing-stages upon which the people of this planet are supposed to alight in their airships.

The greatest mass of mountains in Europe, through parts of which the Simplon Tunnel was made

CONTINUED FROM PAGE 6177.

BORING THROUGH THE ALPS

THE MOST WONDERFUL WAY EVER MADE

THE story of the boring of the famous tunnels through the Alps is like a fairy tale. There are three of these tunnels — the St. Gothard, the Mont Cenis, and the Simplon — and through them, every day, hundreds of travellers pass out of Switzerland into Italy, beneath the Alps, in the very heart of the greatest mountains in Europe, with millions of tons of earth stretching for more than a mile between them and the sky.

Let us take one of these tunnels only — the Simplon. The work occupied 10,000 men nearly eight years, and cost over fifteen million dollars. When Hannibal crossed the Alps with his army, it took him fifteen days, and cost an enormous number of lives. Napoleon took five days to cross when he set out to conquer Italy. He did not forget the difficulties of the crossing, and when he became emperor he built the Simplon Road running along the Simplon Pass, over a shoulder of the mountain, and rising to a height of 6,600 feet. It is 41 miles long; it is carried over 600 bridges, through many galleries and short tunnels cut in the rock, or built of solid masonry to protect the traveller from the swift rush of avalanches in winter. Until the opening of the Simplon Tunnel, that was the only way over the Alps at this point. The Alps are pierced by two other famous tunnels — the Mont Cenis and the St. Gothard — but they are far away from the Simplon.

There are two features in which the Simplon Tunnel differs from all others. Being 12¼ miles in length, it is longer than any other tunnel in the world. A more remarkable point is the immense distance beneath the surface at which it runs. When we reach the highest point to which the tunnel climbs in the heart of the mountain, we have still more than a mile of solid rock above us. It could have been made much nearer the top of the mountain, but that would have meant a very high climb for the trains before reaching the tunnel. On the north, or Swiss, side the entrance is 2,249 feet above sea-level, while on the Italian side it is 2,079 feet. The tunnel slowly rises till it reaches a height of 2,310 feet. Above that lies a mass of mountain more than a mile high. The tunnel slopes slightly towards each end, so that any water which enters may run down the slopes and escape.

The engineers expected to find great heat — for the deeper we go in the earth the higher the temperature rises. They expected to find a heat of about 100 degrees, but when they came to the worst part they met a heat of 132 degrees, while hot water flowed in. There were rivers and lakes hidden in the mountains of which they had previously known nothing. There were soft parts, too, in the mountains, which they had not expected to find.

The two ends of the tunnel — Brigue on the Italian side, and Iselle on the Swiss — became cities of industry. At each end a river was harnessed and made to supply power for driving the many kinds of machinery which were used. A new colony sprang into existence at each end of the tunnel, in which were comfortable homes for the workmen and their families, cafés, hospitals, places of amusement.

Every place these little towns were lighted by electricity, made by the running of the harnessed rivers. The comfort of the workmen was looked after. They had special clothes to work in, warm and cold shower-baths, and cooling chambers were furnished, to prevent their feeling the cold on coming out from the hot depths of the mountain into the chill atmosphere of the Alps. Machinery forced in enormous quantities of cold, pure air, and drew out the foul air. Few horses were allowed in the tunnel, because they made the air impure; and special watering machinery instantly converted the dust into mud, so that the men should not breathe it. The conditions were excellent, and the men worked with extraordinary goodwill.

Work was begun at both ends of the tunnel at once — with 6,000 men on the Italian side, where the harder work was expected, and 4,000 men on the Swiss side. Drills driven by hydraulic power were used to bore holes in the rock, and in the holes thus made charges of dynamite were placed and fired. Water under heavy pressure smashed up the rock which the dynamite dislodged, and long trains carried away the rubbish and brought in building material, so that solid masonry could be built to form walls, and give extra support. Day and night men were at work, working in shifts of eight hours each. All the machinery for the work had to be specially made, and with this the men bored away 18 feet a day. The men on the Italian side worked toward the Swiss side, and those on the Swiss side toward the Italian.

For a time all went well. Soon, however, those on the Italian side met with unlooked-for difficulties. They broke into soft and treacherous ground, where they had expected to meet solid rock. To make this secure, they erected enormous timbers, but these were crushed. Next, heavy steel girders were tried, but so great was the pressure above and all round that these became twisted like wires. Not until quick-drying concrete was built round them could the girders be made to hold up.

Then the workmen came upon an underground river of intensely cold water. It rushed into the galleries at the rate of about 15,000 gallons a minute. That gives over 100,000 tons of water in the course of the day and night, enough to supply all the wants of a large city.

The men worked in mackintoshes and waterproof boots and leggings, but they were in a shower-bath the whole time, and up to their knees in water, and often in danger of drowning. Next, drainage systems had to be constructed to carry away this river, and, after a delay of six months, the danger-spot was safely passed.

Very soon afterwards, however, the rocks into which they were boring began to get hotter, and streams of hot water gushed out. Having passed a river of cold water, they had now come upon another, which filtered down through the scorching rocks. It flowed into the galleries at the rate of nearly 300,000 gallons an hour — a river of scalding water. Nobody on the spot dreamed of giving up the work, though everybody outside thought that the task must be abandoned. The men on the Swiss side also had come upon baking rocks and hot water. The same idea

was adopted for both sides of the tunnel. On the Swiss side powerful machinery pumped in cold water from beyond the end of the tunnel upon the burning rocks and upon the cracks from which the scalding water issued, and so cooled both rock and water. Cold water was also sprayed in the air.

The plan on the Swiss side worked well, until a great storm at that end of the tunnel caused a landslide, which cut off the water supply. The hot water was still pouring in, so the engineers had to put up enormously strong iron doors, right across the tunnel. This, to a great extent, shut out the flow of hot water, and enabled the men to go on building up the walls in the rest of the tunnel. And there they had to leave their boring, and wait for the men on the Italian side to work their way through.

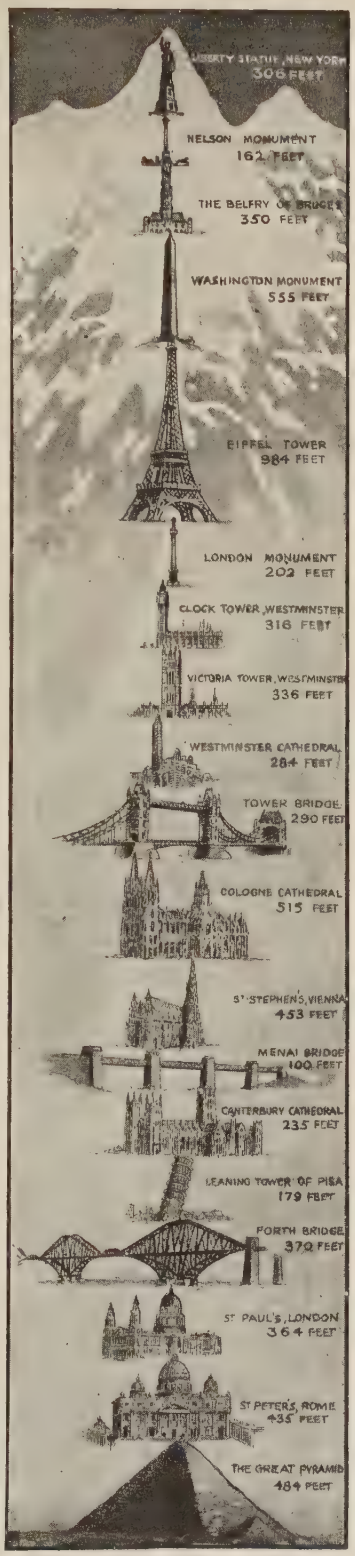
The brave fellows on the Italian side worked doggedly on. They now turned one river against another. The cold river through which they had fought their way was made to serve the pumps, and to help to cool the scorching rocks and water where their present work lay.

Little by little they worked their way onwards to the spot where they expected to break through. They knew exactly the spot at which they *should* break through and make the tunnel complete. They had been for years working in what they hoped was a straight line. Had they gone straight, or had they gone astray, and might they have to go on boring, and find that they had missed the line that they should have followed?

At last the men on the Swiss side heard the sound of the drills, and knew that the others were approaching them. Twenty feet, nineteen feet, then only sixteen feet remained, and so the last barrier was gradually bitten away by the drills. Then came the last charge of dynamite which was to open the way. It was put in and fired, and a hole in the rock eight feet wide opened. To the joy of everybody, they saw that the tunnel was complete. After twelve miles of boring, starting from different countries, the workmen met in the heart of the Alps.

In May, 1906, the King of Italy and the President of Switzerland met in the tunnel, and a month later, nearly eight years from the beginning of the work, trains were running through the Simplon, the longest and deepest of all the tunnels in the world.

This work stands as one of the most marvellous exhibitions of the power of man, who seems so helpless, but is really strong because he knows how to use his brain in accomplishing his purposes.



These 19 high buildings could stand like this between the mountain-top and the trains

WHERE THE UNSEEN TRAINS RUSH PAST

For thousands of years the famous Simplon Pass, shown in this picture, was the principal route across the Alps, but since 1906, when the Simplon Tunnel that had been bored through the solid mass of the mountains was opened, the pass has been very little used. The splendid road was built by Napoleon. Now, instead of slowly plodding or driving across this road, travellers dash through the mountains unseen by the mountaineers.

THE MIGHTY HEIGHTS ABOVE THE TRAIN

AN IMAGINARY VIEW OF THE TRAIN RUNNING THROUGH TUNNEL UNDER THE ALPS

More than a mile below the tops of the mighty mountains rushes the brilliantly lighted train, with its load of perhaps five hundred passengers. The artist here shows us an imaginary section under the Alps, with children above, all unconscious of the fact that, could they but see through the solid rock, the train would appear below, like a fiery serpent boring its way through the black mass beneath them.

BLOWING UP A MOUNTAIN FROM INSIDE

The great tunnel was made by blowing a passage through the mountains with explosives. After drills had bored holes in the face of the rock, cartridges were inserted and a man set light to them, as shown.

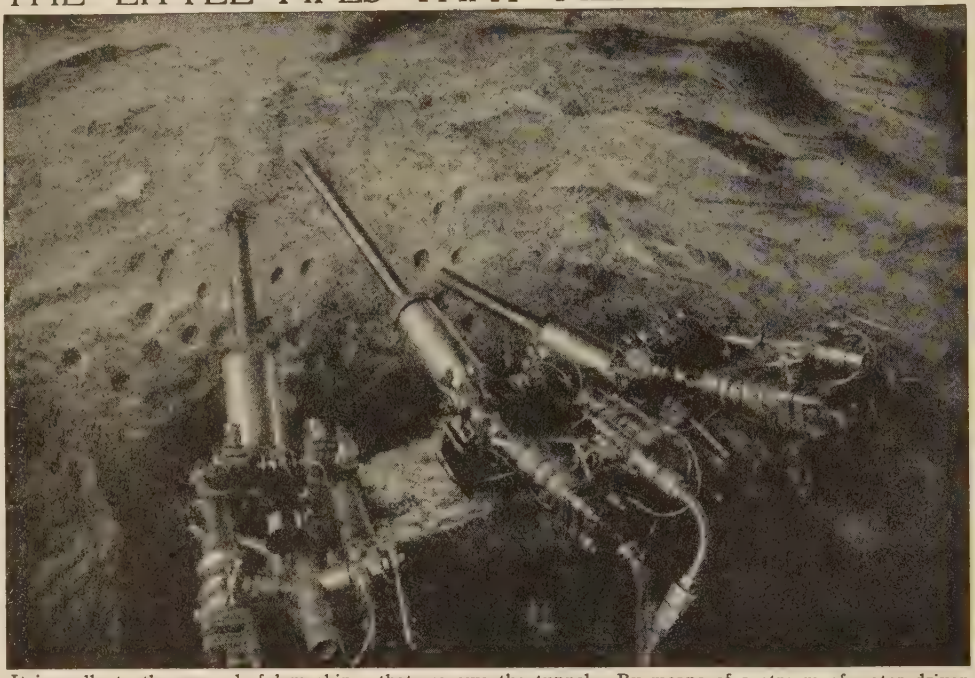
In firing cartridges, a time-fuse was used — a match that would burn for some time before exploding a cartridge — that the workmen could get to a place of safety. Here we see the tunnel after an explosion.

HIDDEN RIVERS OF HOT AND COLD WATER

After blowing away the rock, the men were often in danger of being drowned by inrushing water from springs that had been let loose. Sometimes the water was very hot, like that shown in this picture.

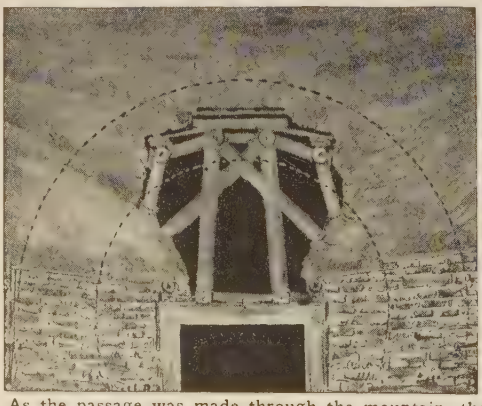
Many times the springs rushed in like a torrent, and here we see a cold spring that was tapped, pouring 15,000 gallons of water a minute into the workings. This caused a delay of several months in the work.

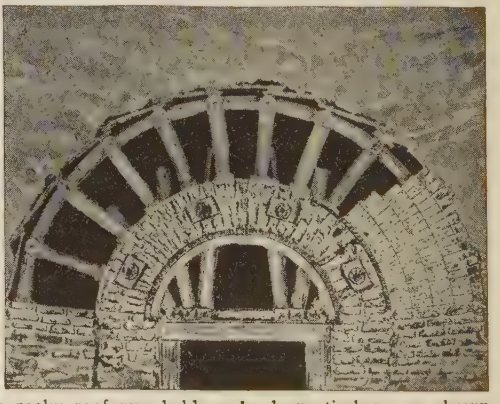
THE LITTLE PIPES THAT PIERCED THE ALPS



It is really to these wonderful machines that we owe the tunnel. By means of a stream of water driven at tremendous pressure, a little pipe with a jagged end is turned round and round, eating away the rock.

For a great part of its length, two passages were excavated, as shown here, and then the dividing wall was removed. This plan rendered easier the ventilation of the tunnel and the removal of inrushing water.

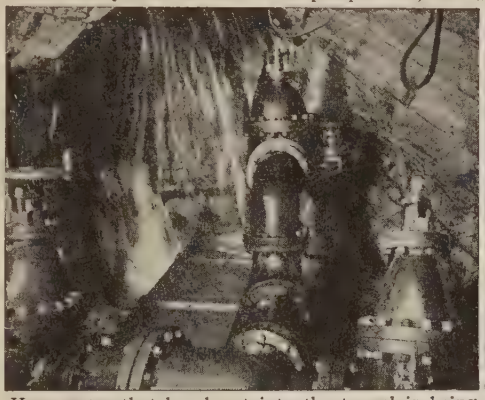




As the passage was made through the mountain, the rocky roof was held up by huge timbers, as shown on the left. Then steel frames with more timber were erected, as on right, and stone walls were built in.

WATER PUMPED OUT AND AIR PUMPED IN

Tunnelling was made possible by the work of huge pumps like the one shown here. Vast volumes of water that poured in had to be pumped out, and a constant supply of fresh air had to be pumped in.



Here water that has burst into the tunnel is being driven to the mouth by a great pump. Flooding was one of the greatest troubles during the work.

Not only was air driven in for breathing purposes, but the locomotives used in the making of the tunnel by the workmen were driven by compressed air.

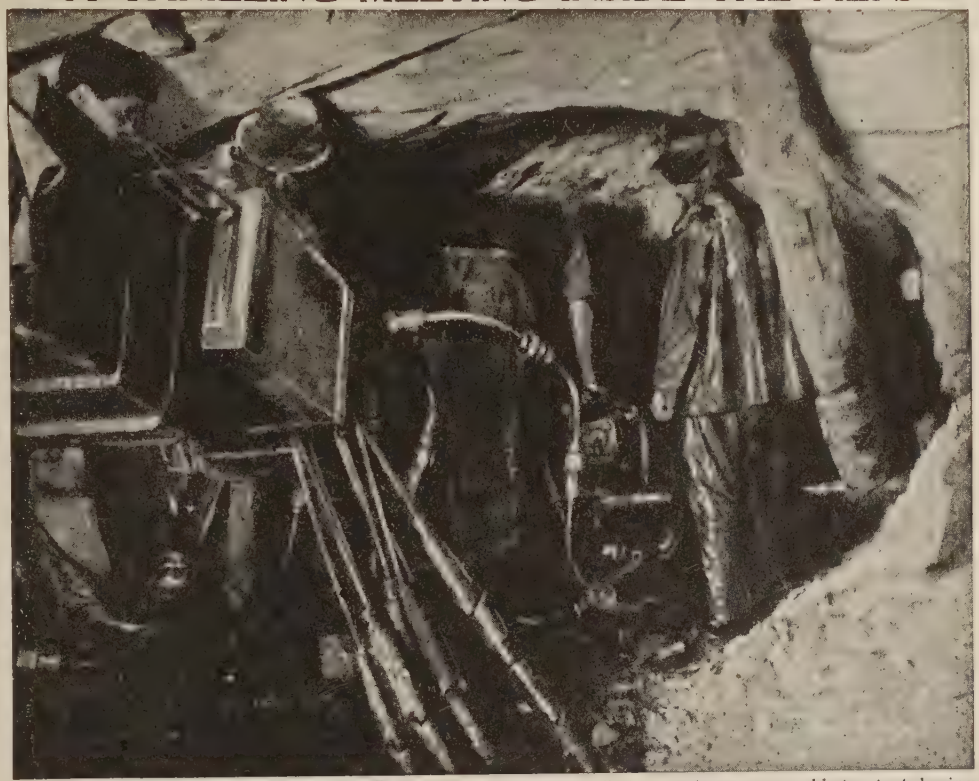
In the heart of the mountains, especially where the hot springs were tapped, heat was so intense that only by having sprays of cold water kept playing upon the walls, was it possible for men to work.

A HORSE IN THE HEART OF A MOUNTAIN

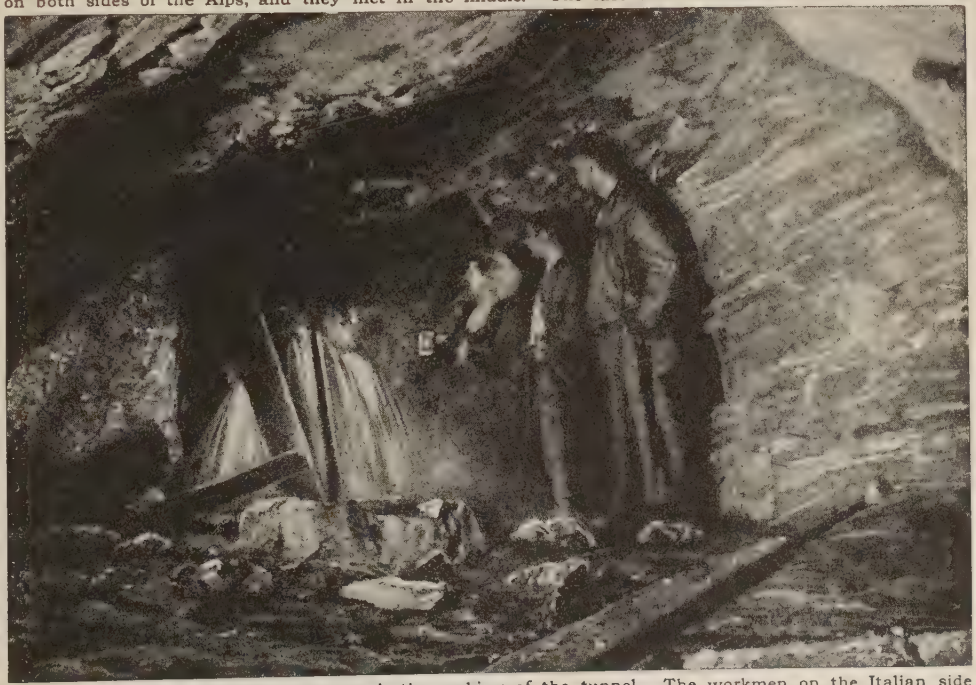
This picture shows a horse inside the Alps. Our forefathers would have laughed at such an idea. Owing to the difficulties of photographing in the tunnel, the front of the horse is larger than it should be.

While the tunnel was being bored, the roof was supported by huge wooden beams; in some parts the pressure of water and loose rock was so great as to break massive beams, and even bend steel girders.

A THRILLING MEETING INSIDE THE ALPS



By means of a theodolite, which means "to see the way plainly," the workmen were able to start boring on both sides of the Alps, and they met in the middle. The last wall of rock is about to be pierced.



This shows the most thrilling moment in the making of the tunnel. The workmen on the Italian side have just pierced the last rocky barrier that separates them from their Swiss comrades.

WHERE THE TRAINS COME BACK TO LIGHT

The Simplon Tunnel, the longest in the world, runs through the Alps from Brigue in Switzerland to Iselle in Italy. This picture shows Brigue, and on the left can be seen the double entrance to the tunnel.

This is the Iselle entrance to tunnel. In boring this passage, one of the world's greatest engineering feats, 3,740,000 holes were drilled, 1,496 tons of dynamite exploded, and 1,229,500 cubic yards of rock excavated.

CONTINUED ON PAGE 6233.

THE CAPITOLS OF TWO SOUTHERN STATES

Situated at the end of a broad street in the pleasant little city of Montgomery is the capitol of Alabama. Here the delegates from seven southern states met in February, 1861, and formed the Confederate States of America. The seat of government was soon changed, however, to Richmond.

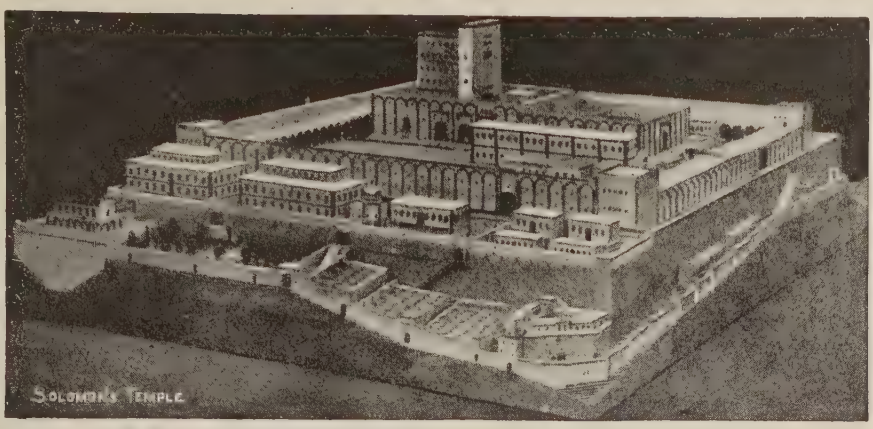
This is the Capitol of Mississippi at Jackson, a very dignified building evidently modelled after the National Capitol at Washington, though with many changes. If you will study the pictures of Greek architecture given elsewhere you will see how much our public buildings have been influenced by men who lived more than two thousand years ago.

Pictures from Brown Bros.

HANNAH DELIVERS SAMUEL TO ELI

Hannah had vowed that if God would give her a son she would give him to His service. Her prayer was answered. The good woman remembered her vow, and as soon as she was able she brought the infant, whom she had named Samuel, to the old priest, Eli, and gave him up to the service of the Tabernacle.

This beautiful picture is from the painting by Mr. F. W. W. Topham



THE SCATTERED NATION

CONTINUED FROM PAGE 6144

THE "Book of All Countries" has now described the principal countries of the world and the people who live in them. We have read of England and the English, France and the French, of Russia and the Russians — to name only a few — and given pages of text and pictures to many very small countries with few inhabitants. Yet we have omitted one of the most important peoples of the world.

We cannot find their country on the map, for they have no separate country of their own, but are scattered over the whole world. They are to be found on every continent and in almost every country. In America they are Americans; in England they are English; in the German Empire they are Germans, and yet they have not been swallowed up by these great nations.

Usually when people come to live in a country, their children intermarry with the natives of the country or with other immigrants and in a few generations the original blood can hardly be traced. Many American citizens can find among their ancestors, Englishmen, Frenchmen, Germans, Irishmen or Scotchmen who came here years ago. The people of whom we speak have not done so but are yet distinct. Still, some of them are among the best citizens of the countries in which they live.

Who are these people and where do they come from? They are the Hebrews, commonly called the Jews, and their story is perhaps the most wonderful in all history. There is no other tale like theirs. If you will turn to the map on page 3875 and will get your Bible, we shall soon find out some things about them. Here is the beginning of the story as told in the Bible.

THE BEGINNING OF THE PEOPLE

Long, long ago, around a city called Ur of the Chaldees, some of the descendants of Noah lived, among them Abram, and his wife, Sarai, with their flocks and herds. The Lord appeared to Abram and told him to go away from his country into the land of Canaan and promised that he would make of his descendants a great nation.

Abram obeyed and removed to the country we now call Palestine. We cannot tell here all the occurrences, but you can find the story in the Old Testament. Abram was promised a son and told to call himself Abraham and his wife Sarah. The son was born and called Isaac. He married his cousin

Rebecca and they had two sons, Esau and Jacob. The latter secured the greater part of his father's property by a trick, and married his two cousins, Leah and Rachel, and had twelve sons. One of these, Joseph, his father's favourite, was sold into Egypt as a slave by his jealous brothers who did not like the way their father favoured him; and there, because of his wisdom, he finally became Prime Minister and the real ruler of Egypt. After a time, because of famine, Jacob and all his sons and their families were moved to Egypt, where land was given them, and where they increased greatly in numbers.

Years afterward, the Egyptians became jealous of them and the rulers inflicted many hardships upon them, though they would not let them go out of the land. At last a great leader, called Moses, arose, and the children of Israel determined to leave Egypt and seek the land promised to Abraham. Finally they were allowed to go, and left Egypt, but for forty years remained in the Wilderness between Egypt and Palestine, where the Lord appeared several times to Moses and gave him laws for the people. The Bible says that the Ten Commandments were given to Moses in this way.

How the Children of Israel Came to the Promised Land

After the death of Moses, a brave and skilful general, named Joshua, led them into the "Promised Land," where they contended for possession with the heathen tribes, sometimes conquering, sometimes losing, but always increasing in numbers. A tabernacle for worship was set up and priests were chosen to offer the sacrifices. To this period belonged Gideon, Samson and the prophet Samuel. After a time they decided that they must have a king and Saul was chosen. One of Saul's lieutenants was a young man, David, who became prominent because, while a young shepherd boy, he had succeeded in killing with a sling and a stone the great champion of the Philistines called Goliath.

Saul became jealous of David and several times sought his life. Finally David and some companions rose in rebellion against Saul and were able to conquer part of his territories. Saul and his sons were slain in a great battle with the Philistines, and David became king of Israel. There was much fierce fighting for a time, but at length the heathen tribes were forced to obey and the kingdom grew more powerful.

Solomon, the Wise King Who Built the Temple

Many interesting events occurred during David's reign, but we cannot stop to tell them now, — not even the sad story of Absalom, his favourite son, who rebelled. At the death of David, his son Solomon became king, and under him the kingdom reached its greatest wealth and power. He built at Jerusalem a temple for the worship of the Lord; he sent ships to every port of the world, and built great public works. The fame of his wisdom reached the ears of far-away rulers, who came to talk with him.

All of Solomon's great works cost much money, however, and at his death the people hoped that their taxes might be lightened. Solomon's son, Rehoboam, who succeeded him, was a proud and arrogant young man with high ideas of the power of a king and threatened to make their lot harder. Under Jeroboam, the northern part of the kingdom revolted and became the independent kingdom of Israel, leaving only the southern part, including Jerusalem, called the kingdom of Judah, faithful to Rehoboam. This division took place, as we count time, about 975 B. C., that is, nearly twenty-nine hundred years ago.

The Fall of the Northern Kingdom

For about 250 years, the story of the two kingdoms is not a happy one. Many of the rulers were bad, some were idolaters, and there was much fighting. Sometimes the two little kingdoms were at war with each other and sometimes with the stronger nations about them. Egypt and Assyria at times demanded tribute, and finally, about 721 B. C., Sargon, who was a general of Shalmaneser, ruler of Assyria, and his successor, captured Samaria, the capital of the northern kingdom, and carried away many of the inhabitants to his own country.

What became of them no one can say, though men have tried to prove many curious things. Some have said that these "Ten Lost Tribes of Israel" somehow came to America and became the ancestors of our Indians; some have thought that perhaps the Japanese are their descend-

WHERE THE GREAT TEMPLE OF SOLOMON STOOD

Solomon built a strong foundation for the temple on Mt. Moriah. Now the spot is occupied by a magnificent Mohammedan mosque, shown in the centre of the picture. Other smaller mosques stand on the great raised platform Ruins of the great castle built by the later kings may also be seen in the neighbourhood.

To this part of the great foundation wall of the platform built for the temple, the Jews living in Jerusalem come every Friday to mourn the departed grandeur of their holy city. Nearly two-thirds of the inhabitants of Jerusalem are Jews, but the government is entirely in the hands of the Turks.

ants; some have thought that the Irish come from them; and many other theories just as absurd have been taught. It is probable that, in their scattered state, they mingled with the people with whom they lived and finally lost their religion and forgot their ancestors. Their lands were taken by colonists sent out from Assyria.

THE SOUTHERN KINGDOM IS DESTROYED

The kingdom of Judah endured for more than a hundred years longer, though for a time it was dependent upon Assyria and then upon Egypt. Some of the rulers were bad men and the people often fell into the worship of the heathen idols such as Baal and Ashtoreth. One great king, Josiah, restored the temple, and for a time things were more hopeful. The prophet Jeremiah, however, said that trouble was coming and warned the people to repent thoroughly of all their sins. Finally, about 606 B. C., Nebuchadnezzar, King of Babylon, which was now the great power in the East, conquered the country, though he allowed the king to remain as his vassal. Many of the wiser Jews, among them the great Daniel, were sent to Babylon to serve the king. Soon the people revolted, and in 586 B. C. Jerusalem was destroyed and many of the inhabitants were taken to Babylon. The governor whom Nebuchadnezzar had left in charge was killed by a member of the old royal family and the remaining Jews fled to Egypt.

EZRA AND NEHEMIAH TRY TO BUILD UP THE KINGDOM AGAIN

In Babylon many of the Jews became important people, and after Cyrus, King of Persia, had conquered the city, he was persuaded to send those Jews who wished to return, to Jerusalem. This was 536 B. C., seventy years after the city had been taken. Later another large company, under Ezra, returned to their old home and soon Nehemiah, a pious Jew, but a favourite of the Persian king, was made governor. Esther, a young Jewess, even became the wife of a later Persian king.

Then for a long period the little province was tossed back and forth among the kings who rose to power. It was overthrown by Alexander the Great, who granted the inhabitants many privileges. After his death, when his great empire had fallen apart, hapless Judæa was a cause of quarrel between Egypt and Syria, for more than a hundred years. Finally it fell into the hands of Antiochus of Syria, who massacred many of the inhabitants and sold others as slaves, and defiled the temple. Their persecution became more than they could bear, and under Judas Maccabeus, a wonderful general, they almost freed their country from foreign tyrants. Unfortunately he was killed in battle, and the work was completed by Simon, his brother, and in 141 B. C. Judæa again became independent. For a time there was peace and prosperity but divisions arose and the great Pompey, of whom you may have read in the history of Rome, captured Jerusalem and carried many Jews to Rome. When Pompey fell before the power of Julius Caesar, the latter made the Idumæan Antipater, a foreigner, ruler. Then his son Herod became " King of the Jews " by the vote of the Roman Senate.

HEROD THE GREAT KING OF THE JEWS

His rule was hateful to the Jews, even though he married a princess of the old line, but his strong arm and great ability enabled him to maintain his power in spite of all his enemies who carried many complaints about him to Rome. When his troubled, stormy life was over, by his will he divided his kingdom among three of his sons. The one to whom Judæa was given was hateful to the people and the Romans took control, though Herod's descendants had a shadowy rule over some of the provinces for a hundred years longer.

During Herod's reign, Jesus was born in Bethlehem, and under the Roman governor, Pontius Pilate, was put to death, but his disciples preached his doctrines and slowly his followers grew in number. At first they came from the Jews, but after Paul became so prominent among them, they admitted outsiders (Gentiles they called them). Fierce disputes between the Jews and the new sect arose, some of the Roman rulers were tyrants, and in the year 66 A. D. the Jewish war broke out.

JERUSALEM IS DESTROYED BY THE ROMAN POWER AFTER A FIGHT

The Roman Emperor, Nero, sent his best general, Vespasian, to put down the

HAMAN MEETS HIS DOOM AT A FEAST

MORDECAI AT THE KING'S GATE REFUSES TO DO HONOUR TO HAMAN

ESTHER INVITES THE KING TO A FEAST AND DENOUNCES HAMAN

Because he hated Mordecai, the Jew who sat at the king's gate, Haman plotted to destroy all the Jews in the kingdom of Ahasuerus, whose Prime Minister he was. Queen Esther, who belonged to the Jewish race, and had been brought up by Mordecai, heard of the plot of Haman and invited him to a royal feast. Haman went to the banquet, but first of all built a high gallows, meaning to ask the king to hang Mordecai upon it ; but at the feast the queen denounced the Minister before the king, who ordered Haman to be hanged on the gallows he had prepared for Mordecai. Mordecai took the place of his old enemy, and so was able to protect his people.

rebellion. Terrible fighting followed, but before Jerusalem had fallen, Vespasian became Emperor and left his son, Titus, to complete the work. Titus closed around the doomed city, but its defenders fought desperately. There was no food, the soldiers on the wall were so weak from hunger that they could hardly stand. All, men, women and children, struggled to keep out the invaders, but finally the walls were broken down, the Roman soldiers entered, the temple was destroyed and the captives who were left alive were sold as slaves.

Thus perished Judæa. Never to this day has it been restored. To-day the Turk rules in Jerusalem. Other countries have gone in much the same way. Assyria, Chaldea, Babylon are now but names. All that is left of them is contained in a few records which the wise men try to read. Their people were swallowed up and soon forgot the glories of the past.

WHY HAVE NOT THE JEWS DISAPPEARED?

Here is the strange, the wonderful difference between Judæa and all the rest. The kingdom of Judæa was destroyed, but the Jews are a vital force to this day. Never in history have there been so many of them, never have they been so influential and so powerful as to-day. What is the reason for this marvellous difference?

Some wise Jews say that the long captivity in Babylon is partly responsible. Before this time they had often forgotten the Lord and turned aside after strange gods; they forgot the Law of Moses, and neglected their religious duties. In Babylon they were in a strange land. Though many succeeded in business and others held high places in the state, they felt that they were strangers. Their religion, the fact that they were Jews, the "chosen people," became more and more important. They thought about it, talked about it, and the feeling grew stronger. The rules of conduct grew stricter and they took a pride in obeying them. Learned men discussed the Law, "The Torah," and the interest in all the sayings of the great teachers became intense.

Not all the Jews in Babylon returned to Jerusalem: many remained there, and as business called them, travelled to different cities and settled there. What is known as the "Dispersion," that is, the scattering, began, and has never ceased to this day.

HOW THE JEWS WERE SCATTERED OVER THE WORLD

After Jerusalem was destroyed by Titus, most of the inhabitants were taken by their new masters to Italy or to the Roman colonies in France and Spain. Permission was given, however, to a famous rabbi or teacher, Johanan ben Zakkai, to open a school at Jabné, or Jamnia. From this school went out many teachers, all of whom worked to make all Jews feel that nation and religion were one, that all were brothers no matter how widely scattered. There were other schools at Babylon and Alexandria, for example, and all did their work well.

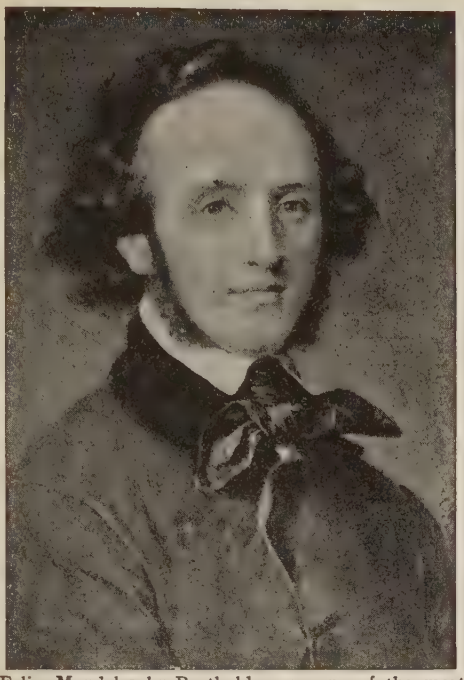
They did not give up their hope of again gaining Jerusalem, and several times strove fiercely in arms against the Roman power, which did not at first treat them so harshly as might have been expected. When Christianity became the state religion of the Roman Empire under Constantine, as you may read elsewhere, their lot became harder, except as their wealth protected them. The Mohammedan power was generally friendly, and in Spain they became very important. Jewish physicians were believed to be the most skilful, Jewish traders and bankers were the favourites at many courts, and Jewish scholars and teachers were the companions of the wisest. Finally, however, they were forced to become Christians or else leave Spain.

THE SACRED BOOK OF THE JEWS

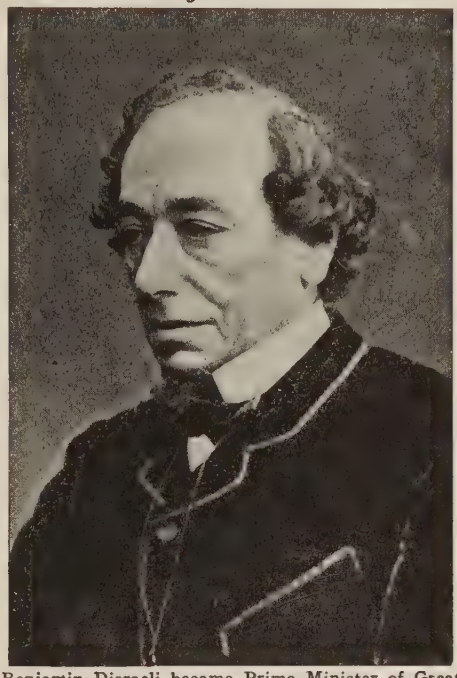
When they were forced to leave Spain and Portugal, they went to Holland, Italy or Turkey. For a time the princes of Germany protected them, but as persecution grew harder, many went to Poland, which was most liberal in its treatment of them though even there they suffered much. Their sufferings, however, only made them cling more closely to the Law, and the explanations of it, comprised in their sacred book called the "Talmud." Many studied nothing else, just as some Christians have said that it is useless to have any knowledge not contained in the Bible, and strict Mohammedans refuse to study any other book than the Koran.

During the Middle Ages the lot of the Jew was very hard, but as men have grown

FOUR WORLD-FAMOUS JEWS



Felix Mendelssohn-Bartholdy was one of the most popular musicians of his time, and his compositions are still much admired. He was a grandson of Moses Mendelssohn.



Benjamin Disraeli became Prime Minister of Great Britain and was raised to the peerage as Lord Beaconsfield. He also wrote many novels and was a brilliant talker.

Judah P. Benjamin was a member of the Confederate States Cabinet. After the Civil War he went to England and became one of the most successful lawyers in London.

Sir Moses Montefiore was one of the greatest philanthropists the world has ever known. He used his wealth for those less fortunate than himself, but always gave wisely.

wiser they have recognised the fact that it is both foolish and wrong to persecute a man for his religious beliefs. In the most enlightened countries the laws which were unfair to the Jews have nearly all been repealed. In the United States and England, for example, they have equal rights with all other citizens.

How some countries still persecute the Jews

In Russia, however, which now includes much of Poland, where there are more Jews than anywhere else, conditions are very little better than they were in all Europe five hundred years ago. They are not secure in the possession of their property, right of travel and settlement except in certain localities is denied them, and only a small number may attend the government schools. Worse than all these, a bloodthirsty mob may, when excited by false stories, attack and put to death great numbers of them. For this the members of the mob are seldom or never punished, and in many cases are encouraged in their dreadful work by the officers of the law.

It is a general rule that the more backward a country is in civilisation, the more harshly it treats the Jews, or, for that matter, the stranger within its territories. Those countries which are free themselves are willing for others to be free. So it is the states of Eastern Europe, which have a tyrannical government, which show the most harshness.

During the Middle Ages and afterward the Jews were often forced to live in a particular neighbourhood and to wear a special dress or, at least, a yellow badge, so that they might be recognised at once. All of this had its effect upon them, and we cannot wonder that their eyes were always turned backward, and that they lived in the past. One great man, Moses Mendelssohn, is given the chief credit of waking his fellows from their slumber. By his writings, his addresses and his personal influence he started a movement which has made the Jew a citizen of the world.

For a long time all the Jews observed the Law very strictly, though there were some differences among the different sects. After Moses Mendelssohn, however, a party known as the "Reformed" Jews arose. These say that all the different points in the Law do not fit modern life, and so they have omitted many of the ceremonies which the "Orthodox" Jews observe. They cling, however, to the principal things, and have many synagogues in the principal cities of Europe and America.

What some of the European Jews have done

To name the great men and women of Jewish blood who have accomplished so much would take a long time and occupy many pages of our book. Therefore we can name only a few, not always the greatest but some of the most interesting.

Music is an art in which those of Jewish blood have been prominent. Mendelssohn-Bartholdy, who wrote the "Wedding March" so often played, was the grandson of Moses Mendelssohn, mentioned above. Rubinstein, the great pianist, Meyerbeer and Offenbach, the composers, and Joachim, the violinist, as well as hundreds of other composers, performers and singers, have shown the Jewish talent in this art. Two of the greatest actresses of Europe, Sarah Bernhardt and Rachel, were both born Jews, and many artists are of the same race.

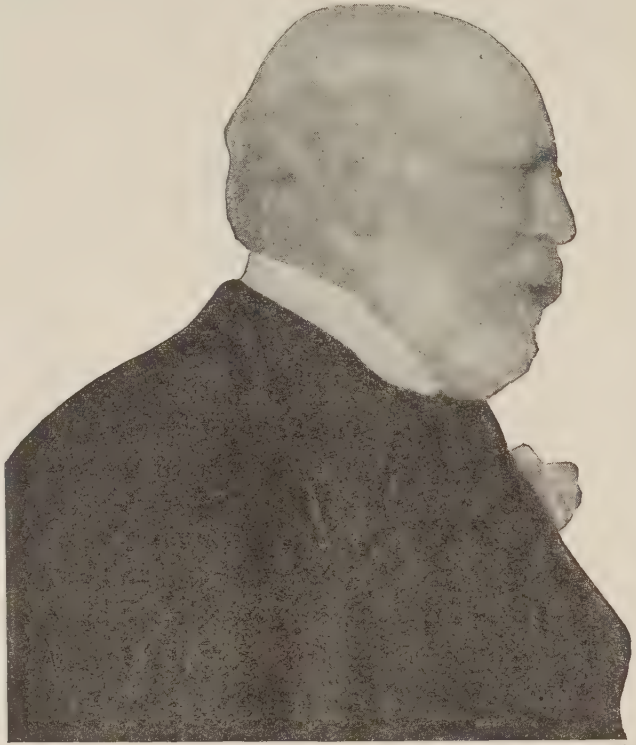
In France and Italy Jews have been ministers of state, but the most interesting of all was Benjamin Disraeli, afterward Lord Beaconsfield, who rose to be prime minister of England. Something of his life is told in another place. But though Disraeli was of the Jewish race he did not follow the religion, but became a Christian.

The most powerful bankers in the world

Lionel Nathan Rothschild, a member of the great family of bankers which has been powerful in several European states for a hundred years, was the first Jew elected to the English Parliament. Though refused at first, the city of London continued to elect him until the law was changed and he was admitted. His son, Nathan Meyer, was made a member of the House of Lords in 1885, the first Jew to be created an English peer. Now two of the members of the British Cabinet are Jews, and members of the race have held the highest offices in the city of London.

While the Jews in Germany have not held so many governmental positions, they have surpassed those of any other country

TWO MEN WHO HOLD HIGH PLACES



Lord Rothschild is one of the best known men in England. He was the first Jew by religion to be created a peer of England, and has used much of his large fortune to help his poorer fellows. His art collection is one of the finest in England.

Oscar S. Straus has held many high official positions. He has three times been Minister or Ambassador of the United States in Constantinople, is a member of the Court of Arbitration at The Hague, has been Secretary of Commerce and Labour, and in 1912 was nominated for Governor of New York by the Progressive Party.

in scholarship, and in literature. Some of the greatest scientists, the most learned historians, and most noted scholars have been Jews. One of Germany's greatest poets, Heinrich Heine, was born a Jew.

We must not forget Spinoza, the Jewish philosopher of Amsterdam, nor Sir Moses Montefiore, who gave a great fortune to help his unfortunate fellows, nor David Ricardo, whose book on political economy, which is the science of wealth, is studied in every university. The socialist, Karl Marx, was also born of Jewish parents.

These are only a few out of thousands who might be named, but they are enough to show how talent and genius will gain fame in spite of prejudice and harsh laws.

THE JEWS IN AMERICA

It is said that some of the members of Columbus' crew were of Jewish blood, and some of the earliest settlers of the Spanish and Portuguese colonies were Jews. They were particularly numerous in Brazil, where they became very wealthy. From Brazil came a little colony to New York, or New Amsterdam, as it was then called. This city is now the greatest Jewish city in the world, as it is estimated that more than 1,000,000 of them now live in or around New York. Before the Revolution there were a few Jews in nearly all the original thirteen colonies.

The persecutions in Russia, together, with the hope of bettering their condition, have brought many thousand poor Jews to the United States during the past twenty years. Here they have settled chiefly in a few large cities, where they often work hard for small wages, and are too much crowded for health. Nevertheless their condition is steadily improving, and many are becoming prosperous. The Jews who came from other parts of Europe years ago, and their descendants, are nearly all successful.

The Jews in the United States have taken, and are taking part in every form of work. Among them are distinguished inventors, lawyers, physicians, writers, actors, scientists, musicians, artists, scholars, and successful business men, as well as mechanics, workmen and traders.

SOME OF THE POSITIONS HELD BY THIS WONDERFUL PEOPLE

Some of the most noted lawyers and judges are Jews; four have served in the United States Senate and about thirty in the House of Representatives; some have been governors of their states; some have served with credit in the army and navy; one (Honourable Oscar S. Straus) has sat in the President's cabinet; and another one, Judah P. Benjamin, once United States Senator, was a member of the Confederate Cabinet during the Civil War. Some of our most learned college and university professors are of Jewish blood. They write books, edit newspapers, manage theatres, write plays. In short, they have a great share in the intellectual life of the country.

In business they are no less successful. Some of the most important banking houses in the great cities are controlled by Jews. The manufacture of clothing is almost entirely in their hands, and they are also largely engaged in other kinds of manufacturing. Some of the largest department stores in the great cities are owned and managed by Jews.

They are liberal givers to charity and education. They maintain orphanages for homeless children, homes for the aged and afflicted, and some of the best equipped hospitals in the country have been built by Jewish money. They have organised societies to take care of the ignorant immigrant, and to help him when work fails or sickness comes. Many Jews observe the old rule of Moses which declares that a man must give a tenth of his income to religious and charitable purposes.

The desire for the education of his children is one of the most amazing and hopeful features in the life of the Jews in the United States. Coming from countries where education was denied them, they flock to the schools in the United States. While many go no further than the grammar schools, a very large number continue in the high schools, college and universities, and often carry away distinctions and prizes from their Christian companions.

A young woman who calls herself Mary Antin recently published a wonderful book called "The Promised Land," in which she tells of the life in a little Russian town, the removal of the family to America, her struggles for an education, and her final success. It is a beautiful story, and Americans are proud to feel that their country is the real Promised Land, not only for the Jews but for all the oppressed.

CONTINUED ON PAGE 6257.

THE BELL OF ATRI: A STORY POEM — By LONGFELLOW

We have already good reason to know that Longfellow is pre-eminent among modern poets in his gift of narrative poetry, or the art of telling again in tuneful verse some old, old story. In the following he gives us, with admirable art and sympathy, a beautiful old legend of an Italian town, the more worthy of remembrance because Italy is a country in which the people as a whole have not yet learned to be kind to animals. The story is told so simply that scarcely any detail requires explanation, but it will help the young readers to know that "Giovanni" is the Italian for John, and "Re" for King.

At Atri, in Abruzzo, a small town
Of ancient Roman date, but scant renown,
One of those little places that have run
Half up the hill, beneath a blazing sun,
And then sat down to rest, as if to say,
"I climb no farther upward, come what may,"
The Re Giovanni, now unknown to fame,
So many monarchs since have borne the name,
Had a great bell hung in the market-place
Beneath a roof, projecting some small space,
By way of shelter from the sun and rain.
Then rode he through the streets with all his train,
And, with a blast of trumpets loud and long,
Made proclamation, that whenever wrong
Was done to any man, he should but ring
The great bell in the square, and he, the King,
Would cause the Syndic to decide thereon.
Such was the proclamation of King John.

How swift the happy days in Atri sped,
What wrongs were righted need not here be said.
Suffice it that, as all things must decay,
The hempen rope at length was worn away,
Unravelled at the end, and, strand by strand,
Loosened and wasted in the ringer's hand,
Till one, who noted this in passing by,
Mended the rope with braids of briony,
So that the leaves and tendrils of the vine
Hung like a votive garland at a shrine.

By chance it happened that in Atri dwelt
A knight, with spur on heel and sword in belt,
Who loved to hunt the wild boar in the woods,
Who loved his falcons with their crimson hoods,
Who loved his hounds and horses, and all sports,
And prodigalities of camps and courts;
Loved, or had loved them; for at last, grown old,
His only passion was the love of gold.

He sold his horses, sold his hawks and hounds,
Rented his vineyards and his garden grounds,
Kept on one steed, his favourite steed of all,
To starve and shiver in a naked stall,
And day by day sat brooding in his chair,
Devising plans how best to hoard and spare.

At length he said: "What is the use or need
To keep at my own cost this lazy steed,
Eating his head off in my stables here,
When rents are low and provender is dear?

Let him go feed upon the public ways;
I want him only for the holidays."
So the old steed was turned into the heat
Of the long, lonely, silent, shadeless street;
And wandered in suburban lanes forlorn,
Barked at by dogs, and torn by briar and thorn.

One afternoon, as in that sultry clime
It is the custom in the summer-time,
With the bolted doors and window-shutters closed,
The inhabitants of Atri slept or dozed;
When suddenly upon their senses fell
The loud alarum of the accusing bell!
The Syndic started from his deep repose,
Turned on his couch, and listened, and then rose
And donned his robes, and with reluctant pace
Went panting forth into the market-place,
Where the great bell upon its crossbeam swung,
Reiterating with persistent tongue,
In half-articulate jargon, the old song:
"Someone hath done a wrong, hath done a wrong!"

But ere he reached the belfry's light arcade
He saw, he thought, beneath its shade,
No shape of human form of woman born,
But a poor steed, dejected and forlorn,
Who, with uplifted head and eager eye,
Was tugging at the vines of briony.
"Domeneddio!" cried the Syndic straight,
"This is the Knight of Atri's steed of state!
He calls for justice, being sore distressed,
And pleads his cause as loudly as the best."

Meanwhile from street and lane a noisy crowd
Had rolled together like a summer cloud,
And told the story of the wretched beast
In five-and-twenty different ways at least,
With much gesticulation and appeal
To heathen gods, in their excessive zeal.

The knight was called and questioned; in reply
Did not confess the fact, did not deny;
Treated the matter as a pleasant jest,
And set at naught the Syndic and the rest,
Maintaining, in an angry undertone,
That he should do what pleased him with his own.

And thereupon the Syndic gravely read
The proclamation of the King; then said:
"Pride goeth forth on horseback grand and gay,
But cometh back on foot, and begs its way;
Fame is the fragrance of heroic deeds,
Of flowers of chivalry and not of weeds!
These are familiar proverbs, but I fear
They never yet have reached your knightly ear.
What fair renown, what honour, what repute
Can come to you from starving this poor brute?
He who serves well and speaks not, merits more
Than they who clamour loudest at the door.
Therefore the law decrees that as this steed
Served you in youth, henceforth you shall take heed
To comfort his old age, and to provide
Shelter in stall, and food and field beside."

The knight withdrew, abashed; the people all
Led home the steed in triumph to his stall.
The King heard and approved, and laughed in glee,
And cried aloud: "Right well it pleaseth me!
Church-bells at best but ring us to the door,
But go not in to Mass; my bell doth more:
It cometh into court and pleads the cause
Of creatures dumb and unknown to the laws;
And this shall make, in every Christian clime,
The bell of Atri famous for all time."

THE MILLER OF THE DEE

Charles Mackay's songs always breathe a genial spirit, and this is one of the heartiest of them. The joy of inward health and gay content is carolled so naturally by the happy miller that he is envied by a passing king. Notice how well a story may be told in easy words. Out of 201 words in these verses 177 are of one syllable, and only one—"nobody"—has three.

THERE dwelt a miller hale and bold
Beside the River Dee;
He wrought and sang from morn to night,
No lark more blithe than he;
And this the burden of his song
For ever used to be—
"I envy nobody, no, not I,
And nobody envies me!"

"Thou'rt wrong, my friend!" said old King Hal,
"Thou'rt wrong as wrong can be;
For could my heart be light as thine
I'd gladly change with thee.
And tell me now what makes thee sing
With voice so loud and free,
While I am sad, though I'm the king,
Beside the River Dee?"

The miller smiled and doffed his cap:
"I earn my bread," quoth he;
"I love my wife, I love my friends,
I love my children three;
I owe no penny I cannot pay;
I thank the River Dee,
That turns the mill and grinds the corn,
To feed my babes and me."

"Good friend!" said Hal, and sighed the while,
"Farewell, and happy be;
But say no more, if thou'dst be true,
That no one envies thee.
Thy mealy cap is worth my crown,
Thy mill my kingdom's fee!
Such men as thou are England's boast,
O miller of the Dee!"

LITTLE THOUGHTS FROM BROWNING

Put pain from out the world, what room were left
For thanks to God, for love to man?
Ferishtah's Fancies

Grow old along with me!
The best is yet to be.
Rabbi Ben Ezra

What hand and brain went ever paired?
What heart alike conceived and dared?
What act proved all its thought had been?
What will but felt the fleshly screen?
The Last Ride Together

Doing the king's work all the dim day long.
How It Strikes a Contemporary

Truth remains true, the fault's in the prover.
Christmas Eve

Man is born nowise to content himself, but please God.
The Ring and the Book

God's in his heaven—
All's right with the world!
Pippa Passes

Here is spring!
The sun shines as he shone at Adam's fall.
The Ring and the Book

It is our trust that there is yet another world to mend all error and mischance.
Paracelsus

Why stay we on the earth except to grow?
Cleon

You never know what life means till you die.
The Ring and the Book

What though I sink, another may succeed.
Paracelsus

We find great things are made of little things,
And things go lessening till at last
Comes God behind them.
Mr. Sludge, the Medium

What I aspired to be,
And was not, comforts me.
Rabbi Ben Ezra

Truth is within ourselves; it takes no rise
From outward things.
Paracelsus

All men are men: I would all minds were minds!
Jochanan Hakkadosh

My own hope is, a sun will pierce
The thickest cloud earth ever stretched.
Apparent Failure

The common problem, yours, mine, everyone's,
Is—not to fancy what were fair in life
Provided it could be—but, finding first
What may be, then find how to make it fair
Up to our means.
Aristophanes' Apology

What's time? Leave now for dogs and apes!
Man has forever.
A Grammarian's Funeral

LITTLE VERSES FOR VERY LITTLE PEOPLE

RHYMES AND JINGLES AND THEIR USE

WHAT is the use of Nursery Rhymes? Did any boy or girl ever ask that? Perhaps not; but it is worth asking. The answer is very simple. Just as we all like stories, so do most of us like poems, which are stories told in words that sound pleasant in our ears, and are easy to remember. But before we can learn poems we learn little verses about funny little folk, and these are called nursery rhymes, because all mothers say them to their children, and the sounds of the words are easy to bear in mind. In this part of our book we have given all the best-known nursery rhymes, many of them having clever pictures with them.

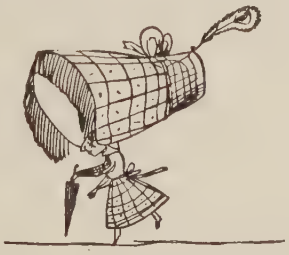
RIDE A COCK-HORSE TO BANBURY CROSS

Ride a cock-horse to Banbury Cross,
To see a fine lady upon a white horse;
Rings on her fingers, and bells on her toes,
She will have music wherever she goes.

THE NONSENSE OF EDWARD LEAR

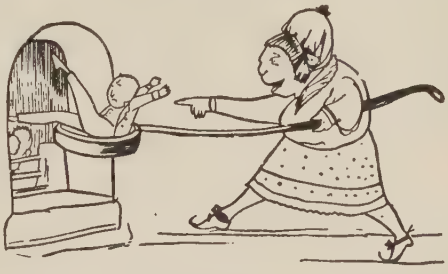
WE are told that "a little nonsense now and then is relished by the wisest men." Many wise men have laughed at the nonsense of Edward Lear, an artist who did much serious work, most of which is now forgotten. He amused himself by drawing funny little pictures and writing funny little rhymes, which have been called "Learicks," after him; and it is those nonsense rhymes and pictures of his which are still popular, while his serious pictures and books have long since ceased to attract readers. His nonsense must be good nonsense to have lived so long. We have chosen some of his funniest pictures and rhymes to reprint here.

THERE was an old man of Melrose,
Who walked on the tips of his toes;
But they said: "It ain't pleasant,
To see you at present,
You stupid old man of Melrose."



THERE was a young lady of Dorking,
Who bought a large bonnet for walking;
But its colour and size
So bedazzled her eyes,
That she very soon went back to Dorking.

THERE was an old man of the Cape,
Who possessed a large Barbary ape;
Till the ape, one dark night,
Set the house on a light,
Which burned that old man of the Cape.



THERE was an old man of Peru,
Who watched his wife making a stew;
But once, by mistake,
In a stove she did bake
That unfortunate man of Peru.

THERE was an old man of Jamaica,
Who suddenly married a Quaker!
But she cried out: "O lack!
I have married a black!"
Which distressed that old man of Jamaica.

THERE was an old person of Cheadle,
Was put in the stocks by the beadle;
For stealing some pigs,
Some coats, and some wigs,
That horrible person of Cheadle.

THERE was an old man who said "How
Shall I flee from this horrible
cow?
I will sit on this stile,
And continue to smile,
Which may soften the heart of the cow."

THERE was an old man who supposed
That the street door was properly
closed;
But some very large rats
Ate his coats and his hats,
While that sleepy old gentleman dozed.

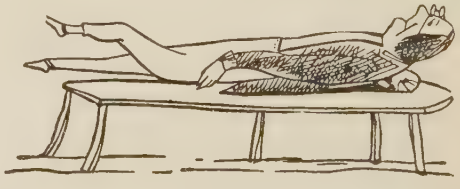
THERE was a young lady of Ryde,
Whose shoe-strings were seldom
untied;
She purchased some clogs,
And some small spotty dogs,
And frequently walked about Ryde.

THERE was a young lady of Troy,
Whom several large flies did
annoy;
Some she killed with a thump,
Some she drowned at the pump,
And some she took with her to Troy.

THERE was a young lady whose bonnet
Came untied when the birds sat
upon it;
But she said: "I don't care!
All the birds in the air
Are welcome to sit on my bonnet!"

THERE was an old person of Anerley,
Whose conduct was strange and
unmannerly;
He rushed down the Strand,
With a pig in each hand,
But returned in the evening to Anerley.

THERE was an old man of Moldavia,
Who had the most curious be-
haviour;
For while he was able,
He slept on a table,
That funny old man of Moldavia.



Bluejackets loading a big gun inside the barbette of a battleship

CONTINUED FROM PAGE 6214.

THE GREATEST NAVY IN THE WORLD

THE LIFE OF AN ENGLISH SAILOR AT SEA

A THOUSAND years ago and more, in the days of Alfred the Great, the English found out that it would be useful to have ships built for fighting, in order to drive away the Danes before they landed, instead of waiting to fight them after they got to shore.

But there was no Royal Navy then. Some of the ports on the south coast were ordered always to have fighting ships in readiness, but their business was to keep down pirate ships which sailed in the Channel. However, when England was at war with France, there were some famous naval battles, and more of the ports were ordered to supply ships, which was fair enough, because it was chiefly towns on the coast which were in danger of attack.

Some of the kings — Edward I., Edward III., and Henry V. — saw how useful fighting ships could be, and they all had a sort of navy. But in those days every merchant ship had to carry fighting men and archers in case of meeting with pirates, so that a number of ships could be brought together when more were wanted.

But it was Henry VIII. who first built a regular fighting fleet, and Englishmen in his time had already found out that skilful sailors could work sailing vessels, so that such ships were more useful than the rowing vessels which were used in earlier times. Elizabeth had a small Royal Navy, but the ships were good. When the Spanish Armada came, the fleet which went out to meet it was made up only in part from the queen's ships. Most of the vessels were supplied by the ports or by private individuals.

After that the Royal Navy grew, and in the time of the Commonwealth the fleet of the Government was very strong. From that time forward, all the fighting was done by the Royal Navy, which was maintained and paid for out of the taxes.

In the last fifty years of the seventeenth century there was not much to choose between the Dutch navy and the English. There have been times when it seemed that the French might make their fleets a match for those of Great Britain. Lately the navies of the United States and Germany have been growing faster than any other, but the Dutch are the only people who have ever fought England single-handed on the seas with success since the Spanish Armada.

Sailors join the navy, as soldiers join the army, because they choose it, but in the old days the navy had the right of forcing any sailor to serve on board the king's ships in war-time; the "press-gang" used to capture them. But all that has been stopped, and the service is now voluntary. It was only during the nineteenth century that steam took the place of sails and ships were built with armour, and now they are all armoured.

THE GREAT FIGHT FOR THE MASTERY OF THE SEA

At this moment there is no sight in the world quite so striking as a naval review, for which mighty warships are gathered together, from those great floating fortresses which are called Dreadnoughts down to the submarine and small torpedo craft which are meant to shatter hostile fleets.

Now, why has England taken so much trouble to build up a mighty navy? If we look back down the past centuries, we shall see that in the reign of Queen Elizabeth Spain had a larger navy, though when she sent her great Armada she learned that English seamanship made a smaller fleet and smaller ships far more than a match for her own. Then, in the next century, the Dutch — though a much smaller nation than the English — had a fleet which could fight on even terms; so that it would have been hard to say which was the better.

WHY ENGLAND NEEDS THE STRONGEST FLEET IN THE WORLD

Let us look for the reason why the British fleet is more powerful than all others, as a great fleet is enormously costly, and no one would build one simply for the sake of saying that it was the biggest.

In the first place, it is because the United Kingdom is a group of islands. Every nation has to protect itself against the attack of other nations in case quarrels should arise which can be settled only by fighting. But if we look at the map of Europe, we see that every other nation has a long land frontier; an enemy can attack it without going to sea.

That is not the case with England. If attacked at all, it must be by sea, and so the attempt has been made to build a navy so strong that no invading force will ever be able to land on English soil. This is the first reason for building a strong navy.

Again England has a large population, but a small area, and cannot begin to produce food enough for the people. This food must come from other parts of the Empire or from other nations. Without a strong navy the ports might be blockaded by the ships of a nation at war with England and the people would suffer from hunger.

A third reason is that if England should wish to invade the country with which she might be at war, she must have a navy large enough to protect the ships carrying soldiers to the other country.

Another point is that even if an invading army might somehow slip past the defences and get into England, a strong navy would be able to prevent their country from sending ammunition and other supplies, without which not much damage could be done.

THE SHIPS THAT GUARD COLONIES AND COMMERCE

But still that is not all, for the British Empire is all over the world, and if England were content merely to guard her own coasts, an enemy might leave them alone, and yet send an army across to Canada, or Australia, or India, or South Africa, and do all the harm he could in those distant parts of the world. The nation must protect distant lands with ships. and be able to drive an enemy's fleets off any part of the ocean, and at the same time to keep enough ships near home to guard her own coasts.

More than all else, also, English wealth and strength depends upon commerce, the trading which is carried on across the seas. If war came with anyone, the enemy would wish not only to send armies against England, but to send out ships to seize goods at sea.

These are the chief reasons why England feels that she needs more than any other nation to have the biggest and strongest fleet in the world.

CONTINUED ON PAGE 6285.

THE COAL THAT MAKES THE SHIP GO

Life on a battleship to-day is very different from what it was in Nelson's time. Then the seaman had to be a real sailor, and know how to manipulate sails. Now a warship is a huge floating machine, and every seaman is a mechanic. Before the ship can move it must take in thousands of tons of coal.

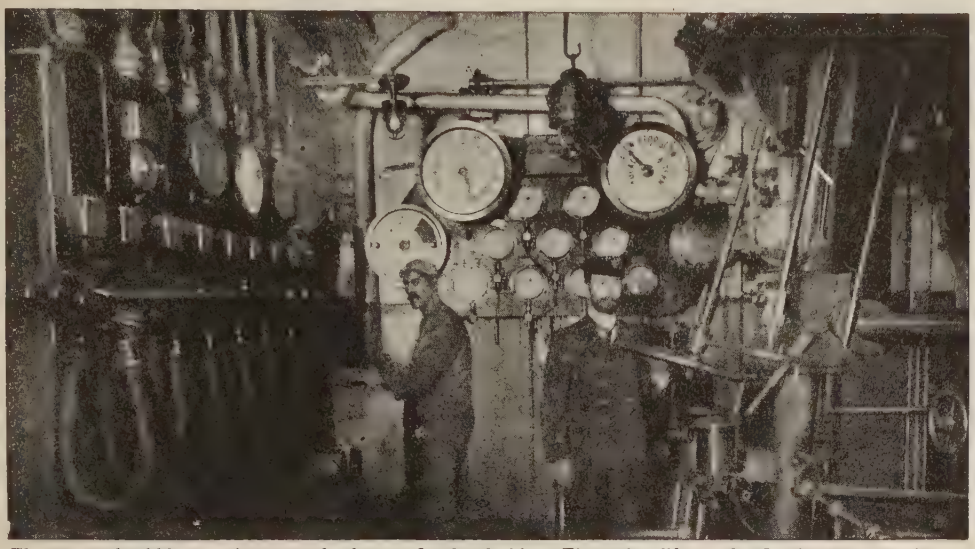
The coal is swung on board by a crane, as shown in the top picture, from the quay, or coaling vessel which comes alongside, and the sacks are quickly unhooked by the men, as seen here, and carried away.

CLEANING THE SHIP AFTER COALING DAY

Coaling a warship is a very dirty task. The men look like negroes, and the deck is covered with a fine coating of coal dust, and has to be thoroughly cleaned. Here we see the men washing funnel and masts.

An army of men wash down the decks, scrubbing the boards until they shine like a kitchen table that has never been used. Nowhere in the world are floors kept more spotlessly clean than on a great warship.

THE LIVING HEART OF A GREAT SHIP

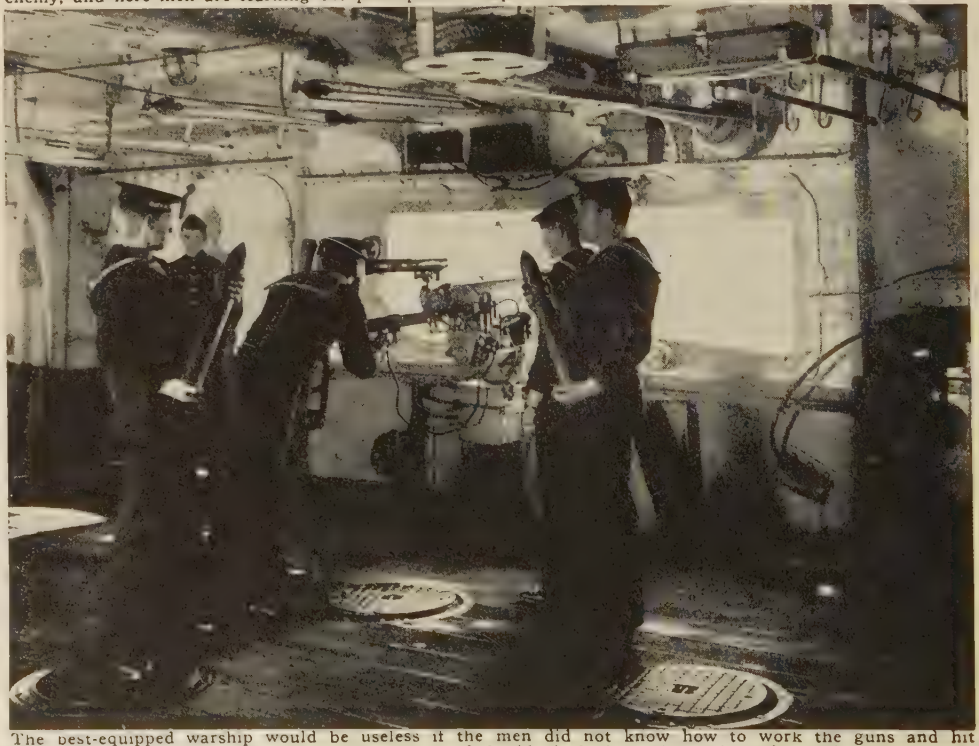


The great throbbing engines are the heart of a battleship. They give life to the floating giant and send it through the waves at the rate of more than twenty miles an hour. Here we see the engine-room.

The engines of the latest battleships do the work of 30,000 horses, and all the time they are moving the furnaces must be fed. This is the stoke-hole of a battleship, where the coal is shovelled into the furnaces.

HOW THE SAILOR LEARNS HIS LESSON

Seamen must understand the weapons with which they would, in time of war, hurl destruction at the enemy, and here men are learning the principles of torpedo construction in the schoolroom on their ship.

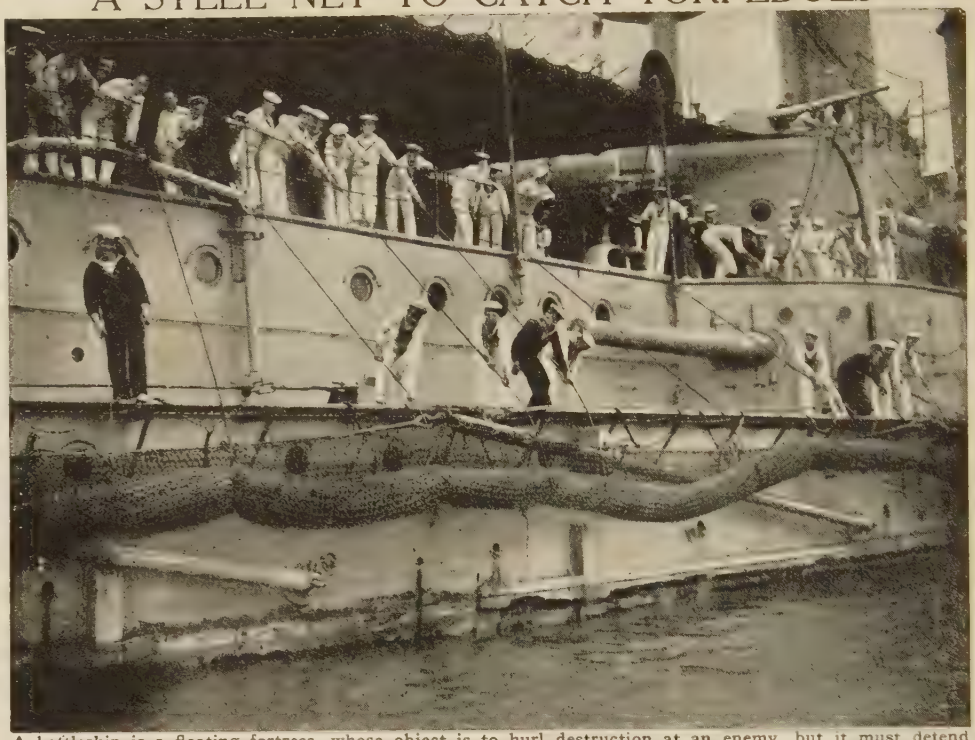


The best-equipped warship would be useless if the men did not know how to work the guns and hit the mark at which they aimed; so a great part of the bluejacket's work consists of gun drill.

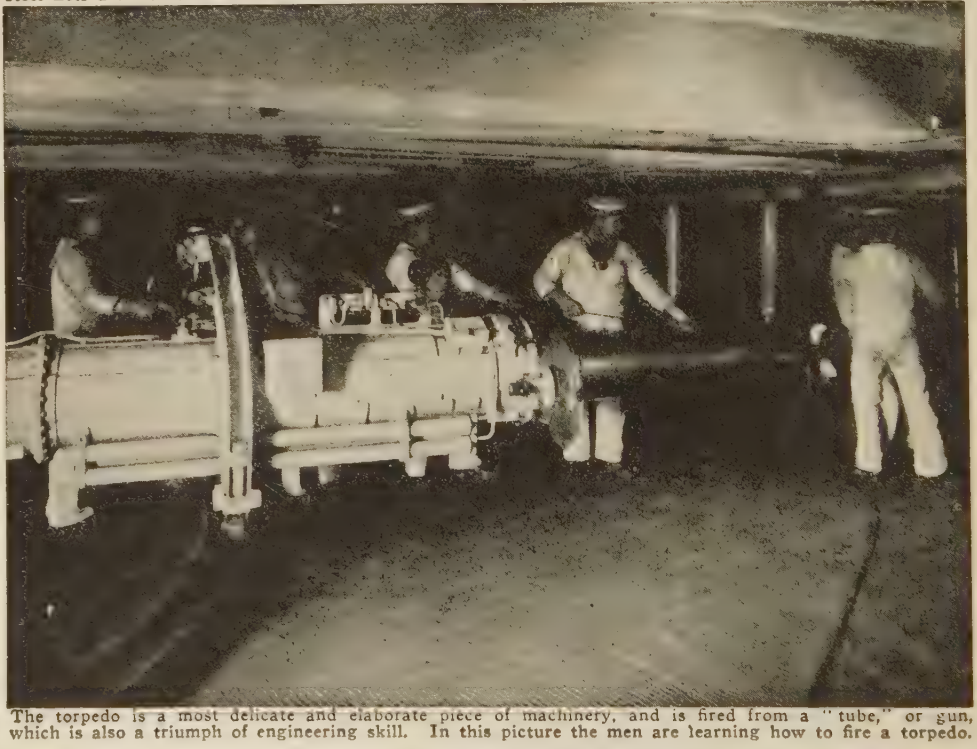
UNFOLDING THE SAILS OF A WARSHIP

Although all large warships are now driven by steam, part of the seaman's business is still to understand the furling and unfurling of sails, and here we see men at sail drill on one of the older types of warship.

A STEEL NET TO CATCH TORPEDOES



A battleship is a floating fortress, whose object is to hurl destruction at an enemy, but it must defend itself also. A single torpedo fired by a smaller ship might sink it in a few minutes; so, in time of war, steel nets are let down round the vessel to catch the torpedoes of the enemy, and thus protect the ship.



The torpedo is a most delicate and elaborate piece of machinery, and is fired from a "tube," or gun, which is also a triumph of engineering skill. In this picture the men are learning how to fire a torpedo.

THE BATTLESHIP ASLEEP AND AWAKE

These pictures give some idea of the marvellous perfection to which the terrible mammoths of destruction have been brought by the latest science of the twentieth century. Here the battleship is asleep and quiet.

The commander in the conning-tower touches a button, giving the order to fire, and in a moment the great battleship awakes and becomes the most terrible thing made by the skill of man. Every gun pours forth flame and smoke, and more than four tons of death-dealing missiles are hurled in a moment at the enemy.

THE SCRAN-BAG OF A BATTLESHIP

When Jack can, in the midst of work, take a rest on a warm afternoon, he throws himself down on the deck and sleeps. He must not leave his things about, or they will suffer the fate of the things below.

Jack is compelled to be neat. If he leaves any garment about, it is seized and put into a sack called the scran-bag, "scran" meaning rubbish. Once a month the contents are sold to the bluejackets, as shown.

SHIPS THAT PASS IN THE NIGHT

The battleship must not only be watchful by day, it must be effective at night; in order to keep keen look-out for stealthy enemies, it is fitted with wonderful searchlights that can be flashed in all directions.

Magnificent and imposing as is a battleship by day, when its steel walls and powerful armament are plainly seen, it is, perhaps, even more impressive by night, when its massive outlines and sombre figure stand out dark and ominous. The possibilities of these great fighting vessels are appalling.

The photographs on these pages are by Gale and Polden, Stephen Cribb, and others

JACK'S FIRST DAY AND LAST DAY AT SEA

It is a thrilling day when the anchor is taken up, and the battleship sails for distant seas. On the voyage home Jack makes a long white pennant, with a foot for every day at sea, and this is flown from the mast, a gilded bladder keeping it afloat. The pennant originated in the whip that was once tied to the mast to show that the English had whipped their enemies. On the right is a pennant 600 feet long.

This is how the men go on board when their ship is out at sea. They climb a rope and walk along a boom that juts out from the side, and thus reach the deck. They are very expert in walking the boom.

CONTINUED ON PAGE 6285.

WHAT THIS STORY TELLS US

THE two great sports of the United States are baseball and football. Baseball is played by a great many more people, for thousands of boys and young men play the game at every opportunity. Fewer play football, but the public interest in the game is quite as great. The following description gives a general idea of the game, and will enable the reader to understand.

HOW TO PLAY FOOTBALL

CONTINUED FROM PAGE 6068.

DURING the autumn months of every year thousands of American boys and young men are playing football. It is the favourite sport in colleges and high schools, and the newspapers print long accounts of the games, some of which are attended by many thousand spectators.

It is a rough game and one who is not strong should not attempt to play it. Even strong boys are sometimes hurt, and, therefore, some parents and some schools object to the game, and do not allow their boys to play. However, if only strong boys, wearing proper clothes, play the game, there is not much danger of serious injury. Players should always wear regular padded football clothes, and strong shoes which fit closely around the ankles. Nose-guards made of rubber and shin-guards are often worn, but are not absolutely necessary.

Football is a very old and widely-played game. Several thousand years ago, we know, it was played by the Greeks. Through the Romans it was passed on to the Britons. The English gave it to America, where it has in the last thirty-five years developed into a game distinct from any played elsewhere.

American football is played upon a rectangular field 330 feet long and 160 feet wide, enclosed by white lines marked on the ground. The lines at the ends are called the goal lines. In the middle of each of these is erected a goal, consisting of two upright posts 18½ feet apart, with a horizontal cross-bar 10 feet from the ground. Parallel with the goal lines, white lines run across the field 5 yards apart. These are the official dimensions. In games between teams of boys, however, the field is often smaller, depending on the space available; and the 5 yard lines, which are merely an aid to the referee in judging distance, are usually omitted.

The ball is an inflated rubber bladder, with a leather cover, usually made of pigskin. It is not round, but drawn out lengthwise into rounded points at opposite ends, to make it more easily handled. The game is played by two sides of eleven men each. Seven of these men, who form the Line, take positions beside one another, facing the goal line to be attacked, as shown on the diagram. The man in the middle is called the Centre. At each side of him stands a Guard; outside of the Guards come the Tackles, and outside of these, the Ends. The remaining four men compose the Back-field. Of these, the Quarter-back stands directly behind the Centre; two Half-backs take their positions at the sides of, and a little further back than the Quarter. Still further to the rear, and behind the centre of the line, is the Full-back's place. This is, in general, the arrangement of the men when in possession of the ball and lined-up for an attack. When on the defence, while the line-men keep their positions, the backs shift to meet different plays by their opponents, sometimes playing far to the rear in readiness to receive a kicked ball. Because they take so many different positions, we do not show the defence on the diagram.

The standard length of time of a game is sixty minutes of actual playing. This is divided into four periods called "quarters," of fifteen minutes each. Between the first and second quarters, as well as between the third and fourth, there is an intermission of two minutes. The period of rest between the second and third quarters lasts fifteen minutes.

Scoring is accomplished in two ways: by touching the ball down behind the goal line, or by kicking it over the cross-bar of the goal. When a player succeeds in carrying the ball across the opposing team's goal line and there touches it to the ground, it is called a *touch-down*, and counts five points. When a team has made a touch-down, the ball is brought out into the playing-field, and one of the men of that side tries a *place-kick*, that is, kicks the ball from the ground where it is held in position by one of his team-mates. If the ball passes

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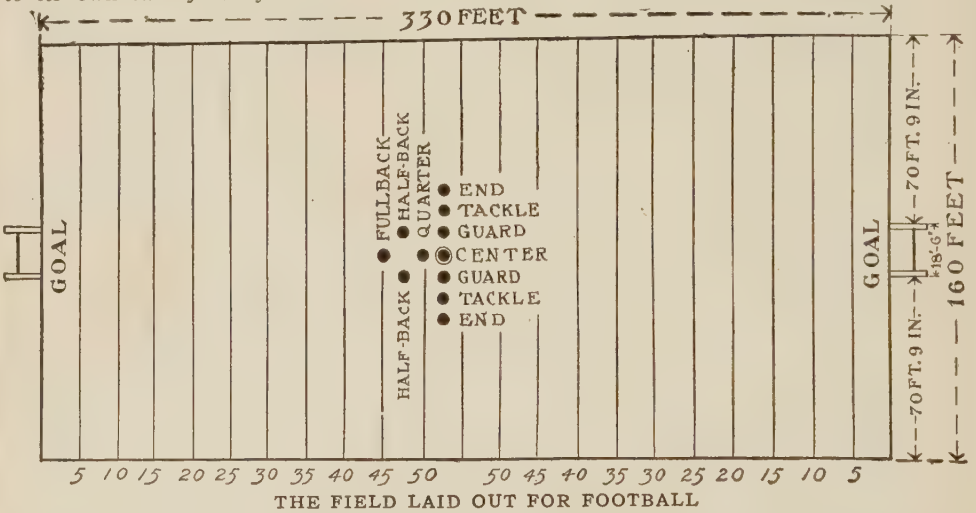
over the cross-bar, it is called a *goal from touch-down* and adds one point to the score. A *field-goal,* which counts three points, may be made without having scored a touch-down, by sending the ball from the playing-field, over the cross-bar, by means of either a place-kick or a *drop-kick.* A drop-kick consists in dropping the ball from the hands and kicking it just as it begins to rise from the ground. When any member of a team is forced to carry the ball behind his own goal line and there touch it down, his team is said to make a *safety.* This counts two points for its opponents. If, however, a team recovers, behind its own goal line, a ball kicked across *by the opposing side,* a safety is not counted. This is called a *touch-back;* it does not add to the score. After a touch-back, the defensive side has the privilege either of carrying the ball out to its own twenty-five yard line and there putting it in play, or of kicking out to its opponents from any point within its own twenty-five yard line.



THE FIELD LAID OUT FOR FOOTBALL

When the game is to begin, the captain of one side chooses which goal his team will defend. The other side places the ball in the centre of the field in readiness to *kick-off.* The players of this side line-up even with the ball. One of their number, after a short run, kicks the ball into the territory of the enemy, who have scattered about their half of the field in readiness to receive the kick. The man who catches the ball starts on a run toward the hostile goal, protected as much as possible by his comrades, and striving to evade his opponents, who have come charging down the field as soon as the ball has been kicked. If the runner succeeds, by dodging, in making his way through the ranks of his opponents and crosses their goal line, he has scored a touch-down. Usually, however, he is tackled and thrown. When his course is thus arrested, the ball is said to be *down.* In that case, the ball is given, at that spot, into the charge of the *centre* of the runner's side. His team-mates line up at the sides of the centre on a line even with the ball and parallel with the goal line in the manner described before when speaking of the players. Opposite them, their antagonists line up. Both sides are now ready for a *scrimmage.* At the signal, the centre snaps the ball to the quarter-back, who passes it to the man in the back-field who has been called on to advance the ball by *rushing.* The rusher tries to carry the ball either through the line or around one of the ends. When he has been stopped, the ball is said to be *down* for the second time. Three such *downs* are allowed, in which to make a gain of ten yards. When ten yards have thus been gained, it is again called *first down.* Thus, the team continues its progress toward the enemy's goal, unless it either loses the ball on a fumble, or fails to gain the required ten yards in three tries. In either case, the ball comes into the possession of the other side, which now makes its attack in a similar way. Often the ball is advanced by kicking, especially when two attempts at rushing have yielded so little ground that success in making ten yards by the third down seems improbable. One of the back-field then *punts,* that is, drops the ball and kicks it before it strikes the ground. A *forward-pass* may be made from scrimmage formation by any man in the back-field, and may be received by an *end,* or by any man who was in the back-field when the ball was put in play. Such a pass may be intercepted by any opponent.

Regarded as *fouls* and forbidden are: off-side play, that is getting in front of the ball; holding or tackling any one but the man with the ball; tripping, striking, or kicking a man; "piling up" on a "downed" player. Boys who wish to play the game in earnest should get the book of rules and study them, and better still, get some person who knows the game to teach it to them.

WHAT TO DO IN CASES OF DROWNING
BEING A LESSON IN FIRST AID TO THE INJURED

ONE of the most important things for all First Aid students to know thoroughly is how to bring about artificial respiration — that is, how to make a person who has apparently stopped breathing breathe again. Unless we know this we cannot render useful service in cases of drowning, suffocation, or gas-poisoning.

There are five different methods of restoring the breathing of an insensible and apparently lifeless person, and they are known after the names of their inventors as Sylvester's, Laborde's, Howard's, Marshall Hall's, and Schäfer's methods. Each is good, and in certain cases has its own advantages, so that we should know them all.

INSPIRATION BY SYLVESTER'S METHOD

SYLVESTER'S METHOD. Place the patient on his back on a flat surface inclined upwards a little from the feet; raise and support the shoulders on a firm cushion or folded garment placed under the shoulder-blades, so that the head will fall well back, as in the first picture; remove all tight clothing from the neck and chest; bare the front of the body as far as the stomach; and cleanse the mouth and nostrils.

Now kneel at the patient's head, grasp the forearms first below the elbows, and draw the arms steadily upwards towards you, keeping them stretched out in that position, with the elbows touching the ground, for about two seconds. The position is shown in the first picture. By this movement air is drawn into the patient's lungs.

EXPIRATION BY SYLVESTER'S METHOD

Still grasping the arms, push them back firmly upon the chest, pressing them on each side of the breast-bone, as in the second picture. This expels the air. After two seconds repeat the movements, and keep on doing so, causing the patient alternately to inspire and expire the air, about fifteen times in a minute. If there are two persons present to render first aid, while one is restoring breathing in the way described, the other should open the patient's mouth, draw forward the tongue, and keep it projecting beyond the lips as far as possible. He should also, if possible, excite the patient's nostrils with smelling-salts or snuff, or tickle his throat with a feather. It is also a good thing to flick the chest with a wet towel or to rub it with a dry flannel.

LABORDE'S METHOD. Sometimes, owing to broken ribs, for instance, Sylvester's method cannot be followed. In that case Laborde's method should be tried. The patient is placed on his back or side, the lips and mouth are cleansed, and the tongue is seized and pulled forward as far as possible, being held in that position for two seconds. Then it is released. The operation is repeated about fifteen times every minute, and to prevent the tongue slipping from the fingers it should be held with a handkerchief. Laborde's method is used in the case of children suffering from suffocation.

HOWARD'S METHOD. The patient is placed face downwards, his chest being supported on a firm cushion or rolled-up garment, and his head resting down on his hand so as to allow the water to run out of the mouth. We then press in upon the patient's back three or four times every few seconds to press the water out of the lungs.

Then, when the water is out, we rapidly turn the patient over with his face upwards, the rolled-up garment being just below his shoulder-blades. His head hangs down, and his hands are placed above his head. Now we kneel down, with the patient's hips between our knees, and, fixing our elbows against our hips, we seize the lower part of the patient's chest, and with all our weight and strength press gradually forward for three seconds, until our mouth is nearly over the patient's face. Then, with a push, we suddenly jerk ourselves back upon our knees. After three seconds' rest we do this again, and then repeat the movement about ten times a minute, until the patient breathes naturally. We should persevere for at least an hour, and when natural breathing begins we should not interrupt the natural breaths, but should do our movements in between. Howard's method can be combined with Sylvester's, the two movements keeping time with one another. Very often our efforts will meet with success.

MARSHALL HALL'S METHOD. The patient is placed on the ground, with his face downwards and the forehead resting on one of his forearms. After a few seconds he is raised slightly while a folded garment is placed for support under the chest. To restore breathing we turn the body gently on the side, and then quickly turn it back on the face again, repeating the movement fifteen times in a minute.

Then we turn on the other side, and back on the face in the same way, doing this fifteen times in a minute, and so we go on repeating till breathing is restored. Each time that the body is turned back on the face, we press firmly and evenly, with the hands one each side of the patient's back, between and below the shoulder-blades, stopping the pressure before turning the patient on to his side again.

Two persons are needed for Marshall Hall's method, as one must attend to the patient's head and arm while he is being turned backwards and forwards. When he is lying on his face, his forehead must always rest on his forearm. The explanation of the method is simple. When on his chest, the weight of the patient's body forces the air out, but when he is turned on his side the pressure is removed, and the air can enter the lungs.

Schäfer's method of restoring breathing

SCHÄFER'S METHOD. We lay the patient face downwards, but with the head turned to one side to leave the nose and mouth free. No pad is placed under him. Kneeling at one side, as in the picture on this page, we place the palms of our hands on his lower ribs, with the thumbs nearly touching each other, and then, leaning forward, we press firmly, though not very heavily, straight down upon the back and lower part of the chest. This drives out the air, producing expiration. Then, drawing back our body rather rapidly, we relax the pressure without removing our hands, and inspiration is produced. This process we continue, repeating the movements at the rate of about fifteen to the minute.

Whichever of the five methods we adopt, we continue the movements until natural breathing is restored.

In cases of drowning it is best to loosen the clothing, clear the mouth and throat of the patient, and then apply the Marshall Hall method. As soon as the air-passages are free from water, Sylvester's method should be used, and if there are two or more skilled helpers it should be combined with Howard's method, as explained.

While breathing is thus being restored, someone should go for blankets and hot-water bottles, and also for a doctor. When the method used is successful in restoring natural breathing, the patient should be wrapped in dry blankets, and the limbs should be rubbed briskly towards the heart to restore the circulation of the blood. Hot flannels, and hot-water bottles or hot bricks should also be applied to the body.

As soon as the patient can swallow, a little hot tea or coffee or beef-tea should be given, and he should then be put to bed, kept warm, and encouraged to sleep. If there is difficulty in breathing, hot poultices or fomentations or mustard-plasters should be placed on the chest and between the shoulders. The patient should be looked after carefully for a time, and if there is any stoppage of the natural breathing, artificial respiration must at once be repeated.

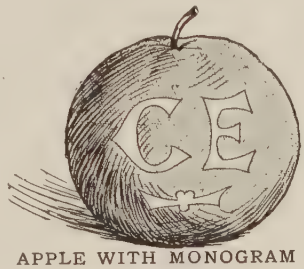
Of course it cannot be emphasised too greatly that in cases of apparent drowning the process of restoring breathing by artificial methods must be applied without a moment's delay. Whether the patient be in a boat or on shore, he should simply have such clothes loosened or removed as confine the chest or hamper and interfere with the breathing. Coats and overcoats should, of course, be taken off as rapidly as possible, and if a tight jersey or vest is worn it should be ripped down the front to save time. A few moments' delay may make all the difference between life and death.

The method of restoring the breathing is the same for all cases of suffocation. For insensibility from electric shock Laborde's method is the best. In rendering aid to a person who receives an electric shock, we must be very careful to insulate ourselves before touching the patient. We must stand on some substance that is a bad conductor of electricity — such as indiarubber, or on a mackintosh, dry silk or cloth, dry hay or straw, or dry glass or brick. To insulate our hands before touching the patient we can use an indiarubber tobacco-pouch, or even a dry newspaper. In rescuing a suffocated person from a room full of smoke or gas, we should tie a wet handkerchief tightly over our nose and mouth, and we must crawl along, keeping low, near the ground.

If you learn thoroughly these instructions, you may some day be able to save the life of a fellow-being, perhaps one near and dear to you. There can be no doubt that every year in hundreds of cases, those given up for dead on account of drowning or suffocation might be brought back to life and restored to health, if only some one knew how such cases should be treated.

HOW TO MARK YOUR NAME ON FRUIT

If we have apple, pear, or plum trees in our garden or orchard, it is quite easy to have our monogram, or any design we fancy, marked boldly upon the ripe fruit, without the assistance of ink, pencil, or any other similar material. The printing of the design is really done by the sun, and the method to be followed is quite simple. We cut out in paper, or thin metal foil such as chocolate is packed in, the monogram, crest, or other design that it is proposed to print upon the fruit, and then, while the fruit on the tree is still green, we stick the paper design upon it with white of egg or a thin paste. The design must be fastened upon the side of the fruit that is exposed to the sun, and when the fruit is full-size, though green. As the sun ripens the fruit, the part still exposed will become red, but the remainder covered by the paper will remain pale green or yellow, and when at last the fruit is picked the monogram or other design will stand out clearly and distinctly, and look very effective. In addition to apples, pears, damsons, plums, and peaches may also be treated in this way.



APPLE WITH MONOGRAM

If the weather is very wet, the paper designs are liable to get washed off the fruit, so that it is wise to have several papers of the same design in order that a washed-off monogram may be replaced by another exactly like it. To avoid this washing away by the rain, the paper design may be varnished, when the water will run off it; and it is not a bad idea to fix over the fruit a little wooden cap or umbrella to protect it from the rain. This, however, must not keep off the sun, or the fruit will not be properly coloured, and the monogram will not show up well.

By following this system we may cause great surprise to our friends, for, if we are giving a tea-party, and know sufficiently long in advance, we may provide fruit bearing the initials of the different guests; and, unless they are in the secret, they will wonder greatly how we have managed to do this. A large fruit-grower, who supplies table-fruit to one of the most fashionable restaurants in New York, always brands the fruit in this way with the monogram of the hotel.

WHAT TO DO IN A THUNDERSTORM

There are some people who, when they hear the roll of thunder, are terribly alarmed, and run to hide themselves in a dark cupboard or cellar. These people are often laughed at for their fear, and, as a matter of fact, there is not the slightest danger to be feared from thunder, which is simply the report and echo of the electric spark caused by a discharge of electricity between two clouds, or between a cloud and the earth. But, on the other hand, we should be on our guard against lightning, for there may be danger in a thunderstorm from the lightning flash, and those people who, out of sheer bravado, expose themselves unnecessarily to the lightning during a storm are simply foolish.

There are three kinds of lightning. Sheet or summer lightning appears as a glare, lighting up a whole cloud, and is either a very feeble discharge of electricity, or the reflection of a more powerful discharge many miles away. This kind of lightning is often seen on warm evenings, and is quite harmless. Forked lightning is a bright, powerful flash, that takes a wavy or zigzag path. In this kind of lightning the spark or flash may pass between clouds that are ten miles apart. Another form of lightning less often seen is ball lightning. It appears as a ball of fire moving slowly through the air, and exploding when it touches the ground. It is very dangerous, but is fortunately rare. This is what people call a thunderbolt, but no solid object, such as is supposed to fall, really comes to the earth.

It is always useful to know what to do in a thunderstorm. In the old days people used to ring the church bells as hard as they could, in the belief that the sound would charm away the thunder and lightning, but this, of course, was merely superstition. We want to take more practical precautions. First of all, if we are indoors, the best thing to do is to keep away from those things that are good at conducting electricity, and might conduct it to us. Heated air, smoke, and soot are good conductors, and so also are metal grates, fenders, and fire-irons. Therefore, we should not stand near the fireplace. It is wise also to keep away from the window, because of its iron bolts and fastenings. Mirrors are good conductors, because of the quicksilver on their backs. The safest part of a room during a thunderstorm is the middle, and it is always good to stand on a thick hearthrug if the lightning is very powerful, as a dry rug, being a bad conductor of electricity, would insulate our body — that is, prevent the electricity passing to it. People who run to cupboards against the walls are doing a foolish thing. The middle story of the house is safer than the cellar or the top of the house.

If we are out of doors, there are also some wise precautions we may take. When riding in a train or omnibus or carriage it is best to sit up as straight as possible, and not lean back, as the electricity might pass through the sides or back of the vehicle.

If we are out walking, it is foolish to go and take shelter under a tree; in fact, it is

unwise in a thunderstorm to stand near any tall object, which is a poor conductor of electricity. As the human body is a good conductor, if the lightning struck the tall object it might pass through our body in preference to the object, owing to the good conducting properties of our body. It is not dangerous to stand near a lightning conductor, as some people think, for that is a better conductor than the human body, and so the electricity would not leave the metal, but would pass down it in preference to anything else.

To stand under a tree is the worst thing we can possibly do in a thunderstorm. No objects are struck so often as trees, and though some kinds are more liable to be struck than others, probably no kind of tree is free from the danger. Sycamore, holly, elder, and hornbeam are not often struck, but they are occasionally; while oak, ash, larch, and elm are probably among those most often struck by lightning, and the oak is usually shattered. Some people deliberately stand under a beech or poplar during a storm in the belief that these trees are never struck, but, as a matter of fact, they are often injured by lightning.

If we are out in a storm in an exposed place, and cannot get indoors, we should take care to keep as far as possible from tall trees and other prominent objects. It is wise, too, in a storm to keep away from crowds of people and from groups of animals, as it is said that the ascending column of warm vapour from the breathing of so many living creatures is liable to conduct the electricity to the place from which the column rises. If we are out in an open field when the lightning is very powerful, and cannot get into proper shelter, it is well, if we have a waterproof cape, to stand on the dry side of this, and fold it up round our feet. Gutta-percha does not conduct electricity, and the cape, if dry, insulates us in the same way as the hearthrug does in a room. We should never stand near a pond or large puddle in a thunderstorm, as, the water being a good conductor, the lightning may strike it, and if we are close by, we also, being higher up than the water, might receive the discharge.

It is never wise to put up an umbrella, especially one of the modern kind with a metal rod, if we are alone in an exposed place, like a common, as the umbrella might act as a lightning conductor. Nor should we have much metal about us in a thunderstorm. If we are indoors and the lightning is severe, we should take off our watch.

FLASHING MESSAGES AT NIGHT

ANYBODY can make a little instrument by which he can flash messages to his friends at night across considerable distances. The idea of the instrument is something like that of the heliograph which soldiers use for sending messages to one another in daylight. The word heliograph really means to write by the sun, and the instrument consists of a little looking-glass that can be twisted about on a stand so as to catch the sunlight, and make flashes that are seen at a distant point.

The instrument we are going to make is very simple. First of all we obtain from the grocer a wooden box about a foot high by nine inches wide, and nine inches deep; the box should have a hinged lid. Inside this we are going to place a lamp, so we bore in the top a few holes, half an inch in diameter, to allow the fumes or smoke to escape. Then in the bottom of the box, which will be the front when it is stood up on end for use, we make a round hole one inch in diameter. Now on the inside of the lid of the box we hang a reflector of some kind to strengthen the light.

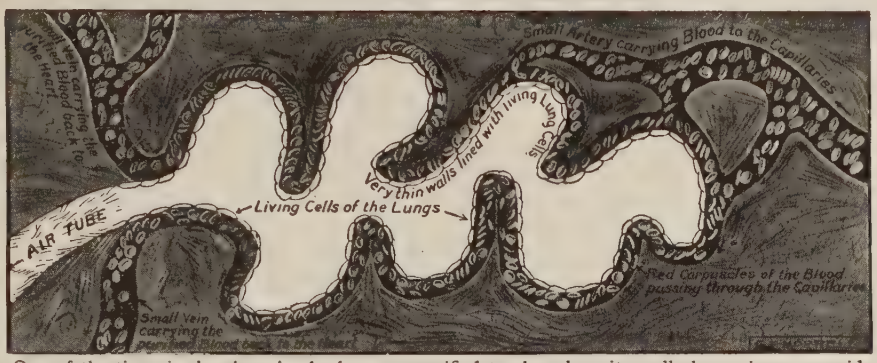
We also want a shutter on the front of the box that can be used to open and close the round hole through which we shall flash our messages. The best thing for the shutter is a piece of sheet tin, zinc, or thin wood. It should be about eight inches long, and two and a half inches wide at the end covering the hole, tapering down to about an inch at the end which will serve as handle. A hole must be punched near the middle, and it is fixed in position with a screw, so that it will cover the round hole in the box. The cover must work quite easily and smoothly on the screw.

Inside the box we place a lighted candle or small lamp, and our instrument is then ready for use. Where a house is lighted by electricity, we can take a lamp on a long wire and put it into the box. Any code of signals can be arranged between two friends, but the most sensible thing to use is the Morse alphabet, giving a short flash for a dot and a long flash for a dash. To make the flashes we hold the shutter by the handle, and work it up and down over the round hole. A little practice will make this quite easy.

Our friend, if he wishes to carry on a conversation with us over a distance, must have a similar instrument. With two flash-boxes it is possible for two friends to talk at night a distance of half a mile.

We begin by placing our boxes each in a window facing the window of the other, and a few rapid flashes indicate that we are going to begin the conversation. When a boy knows the Morse alphabet, which can be found in our book, it is astonishing how quickly, with a little practice, he can flash out messages and read the replies.

If one is confined to his room recovering from sickness, yet not well enough to be out, or if he is quarantined because some one in the family has a contagious disease of some sort, a flash-box can be the source of much pleasure as by it the prisoner can talk to his friends, almost as easily as if they were actually present. A moment's thought will bring up many other uses for this box, which will be a never-ending source of amusement.


Small Artery carrying Blood to the Capillaries
Vein carrying the purified Blood back to the Heart
Very thin walls lined with living Cells
Living Cells of the Lungs
AIR TUBE
Red Corpuscles of the Blood passing through the Capillaries
Small Vein carrying the Blood back to the Heart

One of the tiny air-chambers in the lungs, magnified to show how its walls have air on one side and blood on the other. Little muscles expand and contract the air-chamber alternately.

CONTINUED FROM PAGE 6182.

THE WONDERFUL RIVER OF AIR

AND THE WAY IN WHICH IT KEEPS JACK'S BLOOD PURE

EXCEPT in special need, when Jack is compelled to ventilate his house through his front door, all the air he uses must pass through a complicated filter, warmer, and moistener, which we call his nose. Suppose we have reached the back of his nose, and find a supply of very nearly pure, moist, warm, almost dustless air.

There is some distance yet to go before the air reaches Jack's bellows, or lungs. First it comes to the opening of his great windpipe, which runs down the front of his neck. This pipe must always be kept open, of course, and so it is stiffened with little rings of gristle, or cartilage.

We can readily feel these in our own windpipe just before it leaves the neck and plunges into our middle story. But above the rings there is something much larger, and this is Jack's voice-box, or speaking-machine. Its proper name is the larynx — the first syllable pronounced to rhyme with bear. Now, before the air which has passed through Jack's filter can reach the windpipe it must pass through the voice-box.

There is a little risk here, nevertheless. Jack's larynx is, so to say, a new idea, and has had to be contrived as an addition to Jack's house. So far as the inlet of air goes, his voice-box is simply a difficulty. It does no good, and it makes no use of the air which goes in — only of the air which comes out.

There are two difficulties, really. First, the air-current and the food-current cross each other's paths — which is by no means the best arrangement. Jack's wind-pipe lies in front of his gullet, and every morsel of food and every drop of fluid that enters his gullet has to jump over the opening of his voice-box.

To help this business, his voice-box is provided with a movable lid, attached to the back of his tongue, and when he swallows this lid partly closes over the opening to the voice-box, and partly diverts the current of food to one side, so that nothing goes the wrong way. But, of course, while Jack is breathing, his voice-box must be freely open, and therefore it is quite certain that, whatever happens, he must not try to breathe and swallow at the same time; but sometimes he may laugh — which requires a good in-breath — when he is swallowing, and then he is likely to choke. A choking fit may be unpleasant, but at the same time it is

very interesting. Of course, whatever happens, Jack's ventilation must go on, and therefore his ventilation shaft must be kept clear. When he chokes something has got into the ventilation shaft, and immediately the whole body gives up all other interests and occupations and sets itself to expel the obstruction at once.

For this purpose Jack's house is provided with a large number of powerful servants, or muscles, which can all squeeze upon his chest. No sooner does the ventilation system come to hold an intruder than the sentinels in its walls send up a message to one of the lower telephone exchanges — not to Jack himself — and the order goes forth to cough and cough and cough again, until the obstruction is blown away. Cells inside the windpipe set to work to produce a smooth fluid, so as to make the passage of the intruder easy; and the body will devote itself with such force to this important task that Jack's eyes may fill with tears.

THE NARROW WAY THROUGH WHICH THE AIR MUST PASS

When the air, apart from such accidents, has passed into the voice-box, it comes at once to a narrow chink, and through this it has to pass. Such a chink would never exist in such a place, were it not for a very peculiar purpose.

The edges of this chink are made of elastic fibres, and they are there placed so as to make sounds when Jack's air strikes against them in coming out. So we shall return to them, but meanwhile we only note that these vocal cords, as they are called, which line the chink, are so placed that they can be swung apart whenever Jack takes a breath. And that is what happens. Before every breath that Jack takes, from the cradle to the grave, the unsleeping brain-cells give orders to the muscles which stand beside his vocal cords, and then the muscles swing the cords apart, and the air can enter.

Sometimes, when Jack's house is very young, certain abominable burglars, called the microbes of diphtheria, get into his throat and produce a thick white stuff which may cover over this chink, and then Jack is in danger of death. But nowadays men call in horses to save Jack in such a case. Tiny doses of what the microbes make are given to horses, and their cell-chemists make something which will dissolve this dangerous stuff. The medicine the horses make is called the diphtheria anti-toxin, and it saves the lives of thousands of children all the world over every year.

THE HUNDREDS OF TUBES WHICH CARRY THE AIR TO THE LUNGS

Now, the air has a clear passage down the windpipe until the windpipe splits into two, one going to the right and the other to the left. One branch supplies the right lung and the other supplies the left lung. These branches divide over and over again, like a tree, until at last the air is led, by hundreds of little tubes, to the very stuff of the lungs themselves.

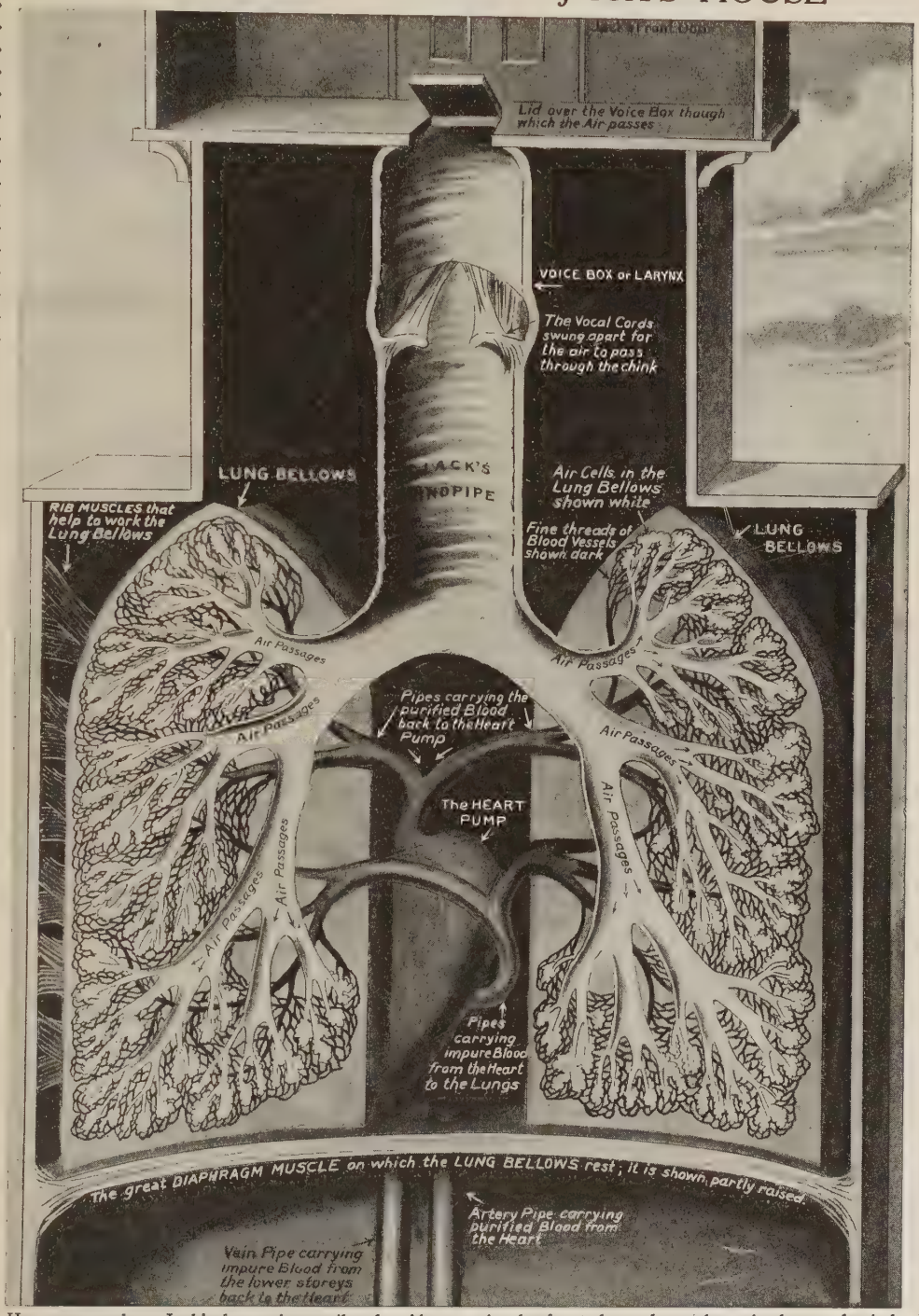
The lungs are certainly a pair of bellows, but we find that they consist of a kind of sponge of thousands of tiny hollow spaces, where the air enters. These little spaces are lined by the living cells of the lungs, and on the other side of this lining of cells is a tremendous number of tiny blood-vessels carrying blood from Jack's heart. So what we find is air on one side, blood on the other, and a layer of living lung-cells in between.

THE LITTLE VISITORS TO THE LUNGS AND WHY THEY COME

This blood is not bright blood, but dark blood. It has been sent to the lungs from the right side of Jack's great pump, to which it had just been returned after travelling all through his body. This blood contains a quantity of carbonic acid gas, a poison, which it has brought to the lungs from Jack's body, and it also contains more water than it needs. On the other hand, the countless millions of red cells which it contains, the air-porters of Jack's house, are empty-handed. They have no oxygen, for what they got when they were last in the lungs they have given away to Jack's body, and now they have come for more.

What happens, then, is quite simple. Through the thin layer of lung-cells there passes a double stream of gases — a stream from the air to the blood, and

THE VENTILATION OF JACK'S HOUSE


Lid over the Voice Box though which the Air passes
VOICE BOX or LARYNX
The Vocal Cords swung apart for the air to pass through the chink
LUNG BELLOWS
Air Cells in the Lung Bellows shown white
RIB MUSCLES that help to work the Lung Bellows
Fine threads of Blood Vessels shown dark
LUNG BELLOWS
Air Passages
Air Passages
Air Passages
Pipes carrying the purified Blood back to the Heart
Air Passages
The HEART PUMP
Air Passages
Air Passages
Air Passages
Pipes carrying impure Blood from the Heart to the Lungs
The great DIAPHRAGM MUSCLE on which the LUNG BELLOWS rest; it is shown partly raised
Artery Pipe carrying purified Blood from the Heart
Vein Pipe carrying impure Blood from the lower storeys back to the Heart

Here we see how Jack's house is ventilated. Air goes in the front door, down the voice-box and wind-pipe, and into the lungs, which are much like sponges, with thousands of hollow spaces lined with living cells. These cells lie between the air and the blood in the hollow spaces, and purify the blood by taking oxygen from the air and sending it into the blood, and by driving the carbonic acid gas and water from the blood into the air, to be breathed out again. The impure blood is always being pumped through the lungs to be purified. In the picture the blood-vessels are shown dark, and the air-passages light.

a stream from the blood to the air. The lung-cells supervise and direct them both. The carbonic acid and the unnecessary water pass into the air — we can see the water when we breathe out on to a window-pane — and the oxygen of the air passes into the blood. In order to make these two exchanges Jack has a ventilation system, and that is what we are all doing day and night without ceasing, as we breathe. We are getting oxygen into our blood, and carbonic acid gas and water out of it.

THE LITTLE RED PORTERS WHO PACK AWAY THE OXYGEN

At once the oxygen is picked up by the red porters who are in the blood for the purpose, and who can pack away a most extraordinary quantity of it. Of course, a little oxygen can be dissolved in blood just as it can in water, but Jack's house could never do with the little amount which his blood itself would dissolve. The red porters make all the difference. Each of them can squeeze together and pack on his shoulders, so to say, an astonishing quantity of oxygen for his size.

The blood, with its air-laden porters, after leaving the lungs, returns to the left side of Jack's great pump, and is at once driven onward to supply every part of his body with air. All the red cells leave the pump in one great channel, but it soon divides, and one cell may find itself travelling through one of Jack's toes, while another may be rushing through his eye-sentinels. No part of Jack's house is forgotten.

THE GIVING OUT OF THE FRESH AIR TO ALL PARTS OF JACK'S HOUSE

In every case the walls of the blood-tubes soon become thinner and thinner. And now we can see happen exactly what happened a little while before in the lungs, except that the process is reversed. In the lungs the red porters got oxygen; now they give it. It is for this that they exist. Most of the cells of Jack's body are far away from the air, and if they are to live air must be brought to them. That is what the bellows and the pump and the red porters exist for. Each little porter hands over to the gasping cells of Jack's toes or eyes or liver or muscles the air that they want; and then the red cells, not quite so red as they were, hasten back to the pump.

But we must not forget the carbonic acid and water. The cells want oxygen for burning. They want to get the power and the warmth, and the fuel they burn is mostly carbon — very like our coal — and hydrogen. When carbon is burnt with oxygen we get carbonic acid gas, and when hydrogen is burnt with oxygen we get water. So the cells of Jack's house are always producing carbonic acid and water. So the blood which leaves Jack's toe or eye is poorer in oxygen but fuller of water and carbonic acid, and while its empty-handed red cells scurry back to the lungs for more oxygen, it also carries these waste matters, one of which is a most rank poison, to the lungs to be got rid of.

THE OVERSEERS WHO LOOK AFTER JACK'S BREATHING

We may now consider the air which has got into the lungs, and how it gets out again. It is by no means the same air, and is also warmer than when it entered, for it has been for a little while quite close to Jack's warm blood.

The air returns by the same route all the way until it reaches the filter, where it takes a slightly different course. On the way, of course, it has to pass through the chink again, but as a rule it does so without difficulty or sound — though not so, of course, when Jack desires to speak or sing.

For us now one more question remains: What drives the air in when we breathe in, and what drives it out when we breathe out? If we notice ourselves we shall agree, assuming that we are quite well, that it is the breathing-in that costs us effort; the breathing-out seems to do itself, and that is quite true. Breathing-in, or inspiration, is like stretching a piece of elastic, and breathing-out, or expiration, is like letting it go again.

Every inspiration is done by certain of Jack's muscles, which exist for the purpose, and are all under the command of a special group of overseers in the lowest part of his brain. These give their orders for an inspiration about six-

teen or eighteen times a minute, but faster or slower according to circumstances. In fever, or if Jack is running hard, and so using up a lot of oxygen, he breathes faster. On the other hand, if Jack gives orders himself, on purpose, from his own study, and quickly takes a number of extra long breaths, he will find that for a little while afterwards he scarcely takes any breaths at all. He has no need to, for the blood and the tissues are filled with oxygen. Deep breathing is very important. By doing this we can get the stagnant air out of the lungs. Our lungs are larger than are needed for everyday use. If this were not true, we should be unable to make any unusual exertion.

It has been proved that the overseers in Jack's brain judge by the quantity of carbonic acid gas in the blood which passes through them. If it rises a little, then they hasten to deepen Jack's inspirations until its quantity falls. Their business is to keep the quantity of carbonic acid gas in Jack's blood below danger point, and to this end they watch and direct, without a pause, from his first breath to his last.

WHAT HAPPENS IN THE CHEST WHEN WE BREATHE

The chief of the muscles through which they act is the great sheet of muscle stretched between Jack's middle story and his lower story. It is called the diaphragm, and when it gets orders to contract it flattens itself so as to make much more room in Jack's chest, or middle story. Jack could not live very long if his diaphragm stopped working, and it is helped by a large number of other muscles between his ribs. These and various other muscles all have the same action as the diaphragm — when they contract they make his chest bigger.

That happens when we work a pair of bellows, and the result is exactly the same. The chest is a pair of bellows, and when it is made larger air from outside rushes in. The air outside has a pressure called the "atmospheric pressure," and directly we tend to create a vacuum, or empty space, in the lungs, the atmospheric pressure drives the air in to fill it. Some creatures force the air in by a force-pump action, just as Jack's pump forces his blood along; but we breathe by a suction-pump arrangement.

THE MILLIONS OF ELASTIC FIBRES WHICH STRETCH WHEN WE BREATHE

When the air has entered, and the chest is deepened and widened, its walls are all in a state of stretching. The ribs are a little twisted, and the muscles are ready to return to their former shape. Further, the lungs themselves contain an enormous quantity of yellow elastic fibres, coiled up in millions and millions all through their substance, and when the lungs are stretched by the air, all these elastic fibres are stretched too, and ready to relax again. So, the instant the muscles of inspiration cease to pull, all these elastic things relax, the chest comes back to its old size, the air is squeezed out, and that is how expiration happens. Of course, we can make "forced expirations" when we deliberately use muscles to squeeze the chest. We do so when we cough, or speak, or sing, or sneeze; but ordinary expiration uses no muscles at all.

Sometimes, when people are old, or take too little exercise, they lose the proper elasticity of muscles, ribs and lungs, the lungs do not get properly emptied, but remain over-stretched all the time; all sorts of disasters follow.

HOW JILL SOMETIMES FAILS TO COPY JACK'S GOOD EXAMPLE

Breathing is so important that it is one of the things we all do quite naturally without being taught. Only sometimes we adopt foolish habits which interfere with it. Jack is not so bad an offender as Jill in this respect, for she sometimes packs her chest into clothes which prevent her diaphragm from moving and her lungs from filling properly. Nature meant every part of Jack's house to have free play for action, and if she had thought Jack would be better with a strait-jacket she would have made him one. If there is one part of his body more than another which should be perfectly free to move as it will, by day and night, it is the chest, which provides his every living cell with the air it breathes.

CONTINUED ON PAGE 6291.

AT THE TOP OF THE MOUNTAINS OF TYROL

Whether we would have quiet valleys, and happy, hospitable people to dwell among, or thrilling heights to conquer, we may find our desire in Tyrol. This is one of many impressive scenes familiar in this land.

The little town of Gossensass, on the railway through the Brenner Pass

CONTINUED FROM PAGE 6226.

A LITTLE MOUNTAIN LAND

THE PICTURESQUE COUNTRY OF THE DAUNTLESS TYROLESE

PEOPLE love naturally the land they were born in, but a few countries have the power of making men who were not born in them love them. Nearly all the countries which make us love them in this way are small and mountainous. Nobody can love a great continent; but many love some little land, that charms with its beauty, or its grandeur, or its romance.

Men born in small mountain lands often love them so much that if they go to distant countries for a long time they pine away under the thought of their absence, and even die. Longing to go home becomes a disease, which nothing except going home will cure.

One of the little countries that is loved deeply by its own people is Tyrol, and it is so beautiful and romantic that strangers who travel there soon begin to think of it and its people with admiration and affection.

Tyrol is a part of Austria — a country within a country, as Wales and Scotland are countries within Great Britain. It has been a part of Austria for more than 500 years, governing itself in many ways, but loyal to the ruler of Austria as its king.

This feeling has separated it from the mountain countries that are its neighbours, for they have long looked upon the strong and ambitious Austrians as strangers and tyrants; but the Tyrolese have always taken sides with the Austrians. While the earlier history of the Tyrolese does not always win our admiration, these brave mountaineers played such a noble part at the beginning of the nineteenth century that they raised themselves to places of honour as patriots.

Napoleon had conquered Switzerland and Northern Italy, and, in alliance with the Bavarians, had occupied the land of the Tyrolese, which the Emperor of Austria and his forefathers had ruled for 440 years. Napoleon was now at the height of his power. His name was a terror to half of Europe, and he was master of the other half. Yet at that moment the dauntless Tyrolese rose in rebellion, under the leadership of Andreas Hofer, a peasant innkeeper from a little valley of Western Tyrol. Thrice did these mountain peasants

TYROL AS SEEN FROM THE TRAIN

GLIMPSE OF THE RAILWAY UP THE BRENNER PASS, AND THE STATION AT THE TOP

A REMARKABLE VIADUCT ACROSS A VALLEY A FEW MILES FROM INNSBRUCK

INNSBRUCK—LOOKING UP AND LOOKING DOWN

THE MAIN THOROUGHFARE OF THE BEAUTIFUL CAPITAL OF TYROL

THE TOWN AND ITS RIVER AS SEEN FROM THE HEIGHTS

retake their capital city of Innsbruck, driving out the French and Bavarians, and for a short time Hofer kept his country free in defiance of the might of the great Napoleon. At last the French returned in enormous numbers, captured Andreas Hofer, carried him off to Italy, and on February 20, 1810, shot him like a criminal.

Thirteen years afterwards Hofer's remains were reverently brought back to his own country, and buried in the great church at Innsbruck. A marble monument keeps his memory green in the hearts of his countrymen. Nor are the nameless heroes forgotten, for on the opposite side of the church another memorial is erected to all the Tyrolese who have died in defence of their country, and is inscribed with the Latin words "Absorpta est mors in victoria," meaning that death is absorbed in victory.

THE WIFE OF A TYROLESE HUNTER

Tyrol is quite filled with high and steep mountains, wild and grand, some holding a chilly burden of eternal ice, and on their broad shoulders a mantle of snow. There is no flat land of any extent, only patches here and there close by the larger rivers. The country is almost the topmost mass of Europe — almost, but not quite, for a few parts of Switzerland are a little higher. It is central, too, and sends its snow-fed waters down to far-distant seas — into the Rhine, and so across Europe to the North Sea; by the Adige, which rushes noisily to the Adriatic Sea; and by the swift-flowing Inn, to the Danube, and eastward to the Black Sea. So this little inland country, by the streams it starts, reaches seas on every side, though far away.

A COUNTRY WALLED IN BY MOUNTAINS

These mountains, walling in this little land, can only be reached by climbing. Either we must climb slowly by railways which thread their way upwards along the sides of stream-cut valleys, or we must follow roads or paths that mount the great hills, till they pass over between the mountain peaks. Whatever way we go, our guide upward is a stream, and we can tell how far we are from the summit of the pass by the lessened size of the stream. When it ceases, we are at the top, and we find that our road takes us to the source of another little stream, which leads us, by its broadening waters, down into the heart of the country.

One of the railways comes up from Bavaria by the comparatively broad valley of the Inn. Another climbs from Vienna, westward, up the course of the River Drave. But most people enter the country either by a line which zigzags up out of the valley of the Upper Rhine, and then tunnels through the Arlberg Mountain, or else they travel from Italy through a great cleft in the mountains made by the River Adige. This last route was known to the Romans 2,000 years ago as "the German Road," because anyone who wished to go from Italy to Germany passed that way through Tyrol. Along it tramped the Roman legions to conquer Germany; and, later, fierce barbarians came pouring down it to destroy Rome,

though she had long been the mistress of the world. That great high-road is now called, at its highest part, the Brenner Pass.

When the train enters Tyrol, alongside the River Adige, and also alongside the German Road, it has climbed only about four hundred feet above the level of the sea at Venice, but it goes up and up with the bed of the stream, till it is more than four thousand feet higher, where it reaches the Brenner saddle, which divides Southern from Northern Tyrol. At first the journey is hot, and the narrow valley is green with vines. But when the town of Bozen is reached the country grows sterner, the road rises more rapidly, and the train, leaving the Adige valley, climbs slowly by the narrow rocky gorge of the Eisack, from summer towards winter.

THE TRAIN THAT CLIMBS A MILE HIGH

Soon the mountains on each side above the deep cutting of the river are covered with snow, and their depressions, high up, are filled with glistening green ice which lasts from winter to winter. The air becomes sharp and clear, and long after the warm days have come to us the snow lies deep on the Brenner saddle. When the panting engine has reached this place it has dragged its load a mile high from the level of the sea, though the line still runs in a valley, with forests climbing up the sides into the snow above. In the summer, after the snow has melted from the pass, the villages and little towns that nestle alongside the lofty German Road are filled with visitors, who wander through the sunlit woods, following the upward retreat of winter.

Where the railway reaches the top of the pass a statue stands, with the name Von Etzel on its pedestal. He was the clever engineer who built the line.

After a level run of two or three miles, the railway finds a little downward stream, the Sill, and follows its descent for nearly thirty miles to Innsbruck, the capital of the country. The growing river descends much faster than the railway can, and so for many miles we are high up on the side of its valley.

If we wish to stop by the way after leaving Bozen, Sterzing and Gossensass are beautiful places on the upward journey from Italy, and Steinach, on the way down between the Brenner top and Innsbruck, is as lovely.

How do the people live in this mountain land? Where the valleys widen out into a little grassy plain, or where the rounded shoulder of a mountain becomes a rich pasture under the hot, clear sunshine, a group of wooden

A TYROLESE HUNTER

houses, with broad, overhanging eaves, cluster close together, and form a village around a little church with a spire bright red or green. And here the people live, shut up in their stove-warmed houses a good deal in winter, and widely scattered at work over their meadows, Alps, and woodlands in summer — a sober, industrious, kind, polite, and independent race. Next to the gathering of their hay in the meadows, and pasturing their cattle, sheep, pigs, and goats on the hills as the snows melt,

FAMOUS TOWNS IN THE MOUNTAINS

BOZEN, AN ANCIENT TOWN WHICH IS THE CHIEF COMMERCIAL CENTRE OF TYROL

CORTINA, A BEAUTIFUL TOWN WITH A FLOURISHING TRADE IN IRON AND TIMBER

THE HAPPY PEOPLE OF THE MOUNTAINS

A TYROLESE BOY

A BOY ON HOLIDAY

A PEASANT GIRL

SALZBURG MILKSELLER

A BROTHER AND SISTER

A GIRL OF SALZBURG

TYROLESE MOUNTAINEER

A PEASANT AND HIS WIFE

A MOUNTAINEER'S WIFE

their work is in producing and using wood. Every village has its forest, which it carefully replants as the trees are cut down; and every stream that tumbles into a valley works saw-mills in each village that it passes. Almost everything the people use is home-made. If a man wants a wheelbarrow, he makes it for himself.

Their food is grown around them, and the cloth with which they are dressed is sometimes homespun. In the winter-time whole families in some of the valleys are busy with wood-carving, and many of the wooden dolls and toys sold all over the world are put together by these handy mountain peasants. Then, too, the hunters are busy when they can scale the crags, and the skilful chamois-hunter is a hero among his fellows. The Tyrolese seem to have a natural love for climbing mountains; it is their pride and recreation.

The capital of Tyrol, Innsbruck — that is, the "Inn's Bridge" — has been important since the dawn of history, because it is a centre where all the roads of this part of the world meet, and the chief crossing-place over the swift River Inn. No town in the world is more beautifully placed. Standing clear in the middle of a small plain, surrounded by finely-shaped mountains, every street has a view that charms the eye, and the main thoroughfares have an imposing natural background at each end. Though the mountains tower over the town on every side, they are far enough away to leave abundant air-space.

Everyone who visits Innsbruck goes to the Hofkirche, a church built about 350 years ago by order of the Emperor Maximilian I., and containing his monument, though he is not buried there. The emperor is represented in bronze, kneeling on a marble tomb, whose sides are used for picturing the story of his life, in delicate marble carvings. On either side of the monument is a row of fourteen large bronze figures of notable men and women who were the emperor's friends, or were claimed by him as his ancestors. One of these statues represents Arthur, the legendary King of England, but the monument, though abounding in details of great beauty, cannot be seen to advantage, and the heroic figures are badly grouped. The simpler memorials, in the same church, to plain Andreas Hofer and his patriot friends mean more.

ANDREAS HOFER'S STATUE

But we have only been looking at Tyrol as it may be seen in passing through it by train, and into its inmost recesses the railway has not yet penetrated. The traveller who is ascending the Brenner road and looks eastwards from Bozen sees strange jagged mountains that shut out the distant sky. There are huge upright peaks, some wedge-shaped, others splintered into spires, here pale grey in colour, there tinged with red and orange, a weird mountain barrier that seems to keep guard over an enchanted land. These are the Dolomite peaks. They take their name from a French geologist, Dolomieu, who first studied the stone of which they are composed. For forty miles from east to west, and thirty miles from north to south, the land is filled with these strange and dangerous mountains which echo daily in summer with terrible thunderstorms; and in the very heart of this wildly romantic land is a lovely flower-decked vale of green pastures ringed round by the great mountains, though the vale itself is four thousand feet above the sea. Cortina is the name of it, and in the wide world there is no sweeter place, though it is so sternly surrounded. One fortunate enough to visit it will never forget.

Eskimo dogs, from the fine copyright painting by Miss Maud Earl of "The End of the Trail"

CONTINUED FROM PAGE 6154.

THE STORY OF YOUR DOG

THE lover of the dog would be lost without the faithful creature which guards his home or keeps him company on his walks. The dog is a very emblem of faithfulness. When it has become fond of a human being, nothing will change its feelings. Starvation and ill-treatment will not kill its devotion. It is almost human in its constancy. No matter how poor a man's home may be, his dog cheerfully stays with him, living on meagre diet of scraps, content with scanty food sweetened by a caress and a kind word now and then. Those who can afford to keep their dogs in luxury can hardly realise the intense devotion which the animal is capable of displaying when it is called upon to bear hardship and privation with its master or mistress.

There is in this friendship between men and dogs something more than appears at first sight. Why should not a dog run away from the house in which food is scarce? It is a flesh-eating animal, belonging to the same family as the wolf and the jackal. It has powerful jaws and terrible teeth. Why should it not, when hungry, do as the wolf or the jackal does? A hungry cannibal never hesitates; how is it that the dog puts to shame a human creature? Ages upon ages of history are an answer to this question; ages and ages of time have gone to make the relations between men and dogs what they are to-day.

The friendship had a real beginning. It did not simply happen that men and dogs came into the world and were friends as soon as they met. In the first place there must have been war between men and dogs, just as there was war between men and all other animals. Far, far back in time, man's life was one long battle with the animals. Man depended upon animals for his food. He was no farmer or gardener. He did not plant corn or vegetables. He would learn in course of time that certain fruits and berries and nuts were good for food, and as certain animals which do not rank high in the scale of creation have the sense to store food, we may imagine that man, even in the dim dawn of his powers of mind, would do something of the same sort. It could not, however, be a storing on any large or systematic scale that he did.

His storehouse, and his very home, might at any time be raided and seized by someone more powerful than himself; the cave in which he dwelt might be invaded by savage beasts. No man will lay up store for the future unless he can be reasonably sure that the store will re-

main safe to serve the purpose for which it is intended. All this makes it plain to us that man, in the early days, must have lived what we call a hand-to-mouth existence. As there were months and months in the year when there would be no vegetable food available for him, he would be driven to eat animal food to keep him alive. He was, therefore, a hunter.

When all the dogs were wild

In those days all dogs were wild, like wolves and jackals. They were among man's enemies. The pet dog of which we are so fond, the dog which is so kind, so intelligent, gentle, and faithful, is descended from a wild beast of the forest. There are scores of different breeds of dogs in the world to-day, of many different kinds and colours and sizes. There is not a country in the world, with the exception of the island of Madagascar, which has not its representative of the dog family. We must be careful about Australia, however. When we say that the various countries have their own dogs, we mean, of course, dogs which are natives of those lands. We do not know certainly that the dingo, the wild dog of Australia, really belongs to that country; we cannot be certain that it was not taken there long ago by the ancestors of the natives whom the first white men in Australia found living there. But, with these two exceptions, go where we will, we find members of the dog family, either dogs as we know them, or in the form of foxes, wolves, or jackals.

The first parents of our pets

"Ah, but those are not real dogs," someone says, as she pats her Boston terrier. True, but the wolves and jackals are the ancestors of all dogs, big or little, rough or smooth. Perhaps some of our dogs are descended from the fox, but there is great doubt as to this. We are safe if we point to the wolf and jackal as the first parents of our pets.

In the first place, then, man was against these animals, and they were against him. Doubtless they, in their hunger, often made war upon him, and he was just as ready to give battle to them. If they meant to attack him, they would soon learn that it was useless for them to do so, one dog at a time. All the members of the dog family, when they are hard pressed by hunger, collect together into packs. They are then better prepared to attack big game. Doubtless many a man fell before the combined onslaughts of packs of these animals. Men are killed every winter in Russia, and in North America, even now, by the cousins of our domestic pets — the wolves.

But gradually the dogs of old times would find that man was different from all other animals. Man was cleverer. He had a different way of walking and running. Having only two legs, he could not speed along with the swiftness of the dog, but in running he had two hands and arms free, and in these he could carry weapons. He could handle a stick or a roughly-made spear. Worse still, he could pick up and throw a stone which could kill. That marked him off from the rest of creation. All other animals had to approach and make a close attack upon their prey; the man could stand and hurl a stone or rock at whatever he wanted to kill.

How the dogs would draw nearer to man

The dogs would notice that man could slay animals upon which dogs themselves depended for food, and the man would leave large portions of the flesh and bones of his prey upon which dogs could feast. Therefore, dogs would come in time to follow man, as the jackal follows the lion or tiger. The dogs would follow the man to his rough dwelling and pick up the scraps of food which were littered about. That would draw the dogs nearer to man. He and they would gradually get used to one another's company.

But, we may ask, why did not man kill the dogs that came near and eat them as food? No doubt he often did, but he would not eat them if he could help it. When we look around the world to-day, we find that men do not eat animals which live on flesh. We eat only animals that live upon grain and herbage. The flesh of the carnivo-

rous animal is coarse and rank, and only when starving do men eat it. It must have been the same in the old days, and that fact would make man less likely to attack dogs which showed any signs of becoming friendly.

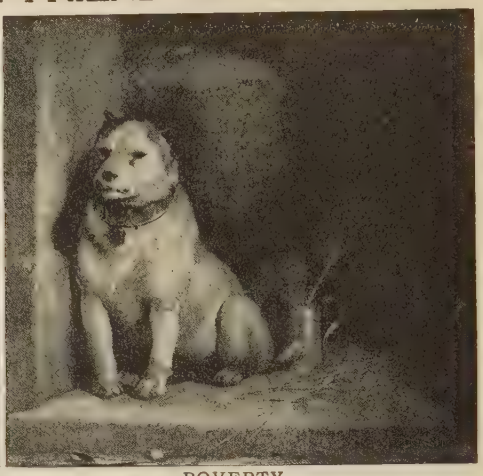
The more they saw of each other, the more man and the dogs would realise the advantage of association. The dogs would see in man a strange, masterful creature, with powers which they could not understand. Man would see the skill and fleetness of the dog in hunting, and would realise how valuable such a keen hunter would be. Some few dogs might make their home permanently near his. More probably he would manage to catch a puppy and bring it up near him, and teach it to hunt for him. With its keen scent and hearing, it would lead him where game was to be found. He would kill the game, and the dog would have some of the flesh as its reward.

"DIGNITY AND IMPUDENCE," FROM THE PAINTING BY SIR EDWIN LANDSEER

It did not all happen in a day or a year. What it came to in the end was a sort of bargain between the man and the dog. The dog would hunt for the man, and the man would kill the game, feed the dog, and also provide it with shelter. Gradually times changed. With the growth of civilisation and im-

THE DOG AS THE FRIEND OF MAN

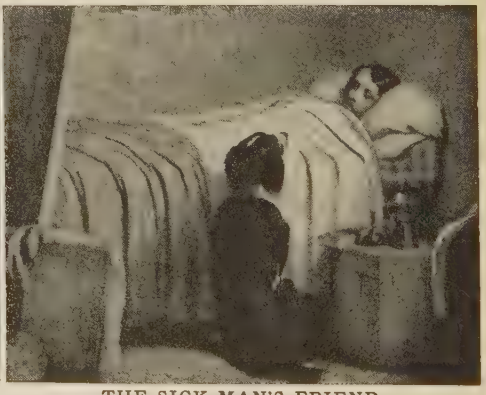
RICHES



POVERTY

A HIGHLANDER PLAYING THE BAGPIPES TO HIS DOG FRIENDS

THE LAST BIT OF BREAD



THE SICK MAN'S FRIEND

THE OLD SHEPHERD'S LAST FRIEND

THE DEAD SHEPHERD AND HIS DOGS, FROM THE PAINTING BY HENRY H. EMMERSON

THE OLD SHEPHERD'S CHIEF MOURNER, FROM PAINTING BY SIR EDWIN LANDSEER

FAITHFUL DOG AT HIS MASTER'S GRAVE, FROM PAINTING BY SIR EDWIN LANDSEER

proved means of getting a living, the man became less dependent on the dog, but the love for the animal which he had inherited from his forefathers did not die.

Away from the towns the old partnership exists in pretty much its ancient form. The shepherd who watches his flocks upon the mountains would be helpless without his partner. The sheep-dog is one of the most perfect examples of animal intelligence. It knows its master's sheep as well as the shepherd, perhaps better than he. It will fetch a lamb out of a strange flock, and restore it to its master's fold. It will collect sheep scattered and strayed upon a hill in the mist; it will drive home, unharmed, the lost lamb, the sheep which has been frightened from its mates.

BLOODHOUND RUNNING AT FULL SPEED

Other dogs which work for their living are the pointer and the setter, the retriever, the terrier, and the foxhound. The pointer, when he detects the presence of game, "points;" he stands rigid, with his nose pointing at the game, so that his master may shoot. The setter, upon finding game, "sets," or crouches. The terrier will kill the rats that annoy his master. The retriever will bring out of the water, or from anywhere else, game which its master has shot. The fox-hound is the rich man's dog, and exists only to hunt the fox.

But it is the sheep-dog that we single out as the best representative of the working dog to-day. Wherever the sheep-dog is at work, observers notice that it takes itself very seriously. It loves the shepherd, but it seems to regard its work as of first importance.

Not very long ago an American shepherd died, and was not found for two days. The dogs went on with the flocks; they drove them gently forward up to the high-lying feeding lands to which they were intended to go, stayed with them, then turned them homewards. Of this faithfulness there is a more charming example, with which many are familiar. Hogg, the Scottish poet-shepherd, had a fine sheep-dog.

A DOG AND ITS LITTLE ONES

One day a great snowstorm swept down over the moors where Hogg's sheep were pastured. Hogg called up the dog, and sent it off in one direction, while he himself took an opposite route. Late at night Hogg returned with his half of the flock, but could see no sign of the dog. Long and anxiously he awaited its return. At last there came a gentle scratching at the door, accompanied by a low whine. He opened the door, and saw all his sheep safe and the dog standing there with a tiny puppy in its mouth. It placed the puppy at its master's feet, then raced off into the snow, soon returning with a second puppy, which, like the other, had been born out in the snow. The faithful creature had gathered the sheep and brought them home, but it had brought home also its puppies, as if to beg from its master the protection it was itself unable to give them.

THE FRIEND OF ALPINE TRAVELLERS

That is the stage to which the partnership between man and his best animal friend has come. But there is other work than sheep-minding for the dog to do. How many lives have the mighty St. Bernards saved up in the Alps? They were trained by the kind-hearted monks to go out on to the snow-covered mountains, and to find travellers who had become exhausted by the cold. The dogs call assistance by their barking. They themselves carry a little barrel slung round their necks containing refreshments. One of these

dogs, a noble creature called Barry, saved the lives of forty persons lost in the snow. He found a little child lying in the snow under the influence of that fatal drowsiness. The dog roused the little sleeper by licking its face, then, lying down, allowed the child to climb upon its back, and so carried the little wayfarer in safety to the monastery.

Dogs such as Barry are big and strong enough to kill the people whom they save, and it must have been a timid person, fearing that Barry had some such intention, who caused the animal's death, for one day this grand old dog was killed. A pathetic inscription is set up over his grave: "Barry, the heroic. Saved the lives of forty persons, and was killed by the forty-first."

BELGIAN MILK-SELLERS WITH THEIR PICTURESQUE DOG-CARTS

When primitive men first began to make tools, and with them to model contrivances with which they could carry things, doubtless ice-sledges would be among the first conveyances that they would fashion. They would harness dogs to them. This is suggested by the fact that the Eskimos have used dogs as beasts of burden ever since they have been known to travellers.

The Eskimo dog is the animal which shows us most clearly what our own dogs used to be like. It matters not where you find him — in Arctic America, in Siberia, in Kamchatka — he is always the same, a sort of moderately tame wolf. When at liberty he mixes with wolves, if there be wolves about, and in a pack of Eskimo dogs in Arctic America there is almost certain to be as much of the wild wolf as of the true Eskimo dog. In these far northern regions we get a glimpse of the way in which our ancestors and the dogs' ancestors got on together. The Eskimos must have dogs to enable them to move their encampments from place to place. But when the day's work is done the dogs become simply wild animals. They get a few mouthfuls of fish for their wages, take a gulp or two of snow, and that is their supper; they will get nothing more from their master until the morrow, when another piece of fish will be thrown to them. They must hunt for themselves if they need more. And they do hunt, with the result that it is impossible to keep sheep, or goats, or birds where these dogs are. They kill and eat anything.

The Eskimo dogs can be as faithful as other dogs where man is concerned, but they fight among themselves with terrible ferocity. Dr. Nansen, when he was exploring in the Arctic regions, lost several of his dogs from this cause. When they were liberated at night they

MANY MEMBERS OF ONE GREAT FAMILY

These pictures of prize dogs give some idea of the astonishing variety in the dog family

MAN'S BEST FRIEND AMID ETERNAL SNOWS

St. Bernard dogs rescuing exhausted travellers after a snowstorm in the Alps

Eskimo dogs dragging a sledge over hillocks of ice

Dogs of the Monastery of St. Bernard, famous for their heroism in rescuing travellers

would start a quarrel, and every one of the pack would turn upon the dog which seemed to be getting the worst of the battle, and kill it. The time came when, on a sledge march over the ice, Dr. Nansen was compelled to kill some of the dogs in order to feed the survivors. It was sad work, and the dogs turned in disgust from the flesh of their dead companions. Sometimes they held out so long that they had to be served from the supplies of other food saved for Nansen and the one companion who was with him.

DR. NANSEN AND HIS BRAVE DOGS

But when food became so scarce the dogs were compelled to eat their dead comrades. It was a sad and grievous time for the two men of the little party. One by one the dogs were slain until only two remained. There was no food left for them, and the explorers, having now reached open water, had to convert their sledges into rafts. The poor dogs could no longer be of service, and there was nothing on which to feed them if they were taken as passengers. They would have starved had they been left where they were. It was merciful, then, to put an end to their lives.

But the two men felt like murderers when they thought of what they had to do. The dogs were the best of all the team. One was the dog which, after a fight, had always mounted guard over the slain dog. In the morning, after one of these deadly battles, in which a dog had fallen a victim to the fury of its fellows, this one dog would be found acting as sentry over the remains.

THE SADDEST MOMENT OF A MAN'S LIFE

The time had come when this poor creature had, like the rest, to die. Nansen called one of the two dogs his, and the other his comrade Johansen's, and when it came to killing them, neither could slay his own. So, while Nansen shot Johansen's dog, Johansen shot his master's, and there were not two sadder men in the world than Nansen and Johansen at that hour, standing nearer the North Pole than any other men had ever stood up to that time. They had set out from their ship with twenty-eight dogs to draw their sledges; they were now going back to the ship, after their long and terrible journey, without a dog remaining. They were leaving behind them, dead amid the eternal snows, the friends without whose help they could never have got there at all.

Nansen's were not the only dogs to give their lives for their masters in that terrible frozen North. If a dog could speak it would tell us, that it would gladly die for the human being it loves. The old, old partnership has made the dog a hero, and many a dog has risked or sacrificed its life for its owner. Many stories, of which the truth is not to be doubted, have been told of dogs dying on their owners' graves.

THE LOVE STRONGER THAN DEATH

Not long ago a little girl who was in ill-health was taken from Scotland on a sea voyage. At her special request her pet collie was taken with her. The poor child was too ill to recover, and died at sea. The frail little body was placed in a tiny coffin, and sadly lowered into the sea. Among the watchers was the little one's favourite dog. He seemed to understand the meaning of the sad ceremony, and, as the coffin was dropped into the water, the poor dog disappeared over the side of the ship, following his little mistress into the depths.

The poet Wordsworth has given immortality to three dogs which claimed his affections. One of them was heard by a shepherd to whimper and faintly bark, away in the hills. The shepherd went to the dog, which led him to the remains of his master. Three months before, the man and his dog had passed that way. The man had slipped and fallen and died, and all this time the dog had stayed by to guard his body.

That was more than a century ago, but the dog is still the same loyal, loving creature that he became ages ago, when his fierce and shaggy ancestors made an unspoken bargain with the early men.

CONTINUED ON PAGE 6295.

WHAT THIS STORY TELLS US

IT has been the glory of the United States that the poorest may rise to the highest positions. Below you read how a poor Scotch lad has become one of the richest men in the world. This is not all. He is using the enormous fortune to enable other young men to rise. Mr. Carnegie believes in helping young men to help themselves. Therefore the larger part of his gifts have been devoted to educational purposes.

A SCOTCH LAD WHO BECAME A MILLIONAIRE

CONTINUED FROM PAGE 6160.

You have all heard of Andrew Carnegie. In another part of this book you have read of the Hero Fund Commission which he established; perhaps you heard your mother and father speak of the large fund which he gave toward the establishment of universal peace, or perhaps you live in a city or town where one of his libraries has been built. Yet this man, many times a millionaire, who is now devoting his life to wisely giving away his millions of dollars, was once a little blue-eyed Scotch laddie who slaved from morning until night as a bobbin-boy in a cotton factory in Pittsburgh.

Andrew was born in a little house, in Dunfermline, Scotland, some seventy odd years ago. There were four in his family, father and mother and Andrew and his little brother, John. Mr. Carnegie was a master-weaver who owned several looms and employed several apprentices. When Andrew was a little lad of eleven his father's work ran short, and the family found themselves face to face with starvation. After a consultation it was decided that they should sell their things and move to America "to give the boys a chance."

Once in America Andrew and his father took positions in a cotton factory. The hours were long and the work was tedious, but Andrew kept a smiling face, and if he were often very tired indeed for a little boy, he did not mention it to the brave little mother at home, who after her household work was done would bind shoes to make extra money for the little family. Andrew was very proud of being able to help in the family support, and it was one of the happiest moments in his life when he took his first week's wages of $1.20 home to his mother.

But the lad was not destined to remain a bobbin-boy for long. A gentleman who had come from his home town heard that the little blue-eyed bobbin-boy had come from Dunfermline, and at once offered him work at an increased salary in his own factory. At first Andrew tended the furnace, but the work was such a dangerous and responsible one that it began to have an effect upon the boy's nerves. He could scarcely sleep at night for fear something would happen to the furnace, and he often woke up from horrible dreams in which the whole factory had been blown up.

It was a great relief to Andrew when his employer took him into his office to act as his private clerk, and a still greater relief when he was able to leave the factory altogether and take a position as a messenger boy in the telegraph office at Pittsburgh. He had never been in such comfortable surroundings before, and he was very happy in his new work. His only fear was that he would be discharged because he was not well acquainted with the city, so when he went home at night he studied the different streets until he could repeat the names of the firms in each one backward and forward with his eyes closed. Then his mind was at rest. He next obtained permission to practise on the telegraph instrument out of office hours, and he soon became expert at receiving and sending messages by wire. One day his chance came to him. The wire repeated a death message. None of the operators was around, so Andrew took it down, with the result that he brought himself to the attention of the superintendent, and he was presently promoted to the position of telegraph operator. He then became a train-despatcher for

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the Pennsylvania Railroad. The young man was so happy in his new job, so brisk and capable that Thomas A. Scott, superintendent of the road, noticed him and asked his name.

"Andy Carnegie, a Scotsman from Scotland," was the reply.

Now Mr. Scott was of Scotch blood himself and he immediately felt an interest in the bright young telegraph operator, who flashed messages with such lightning rapidity over the wire. He offered the young man the position of private secretary in his own office.

superintendent of the Western or Pittsburgh Division.

What an advance for the little bobbin-boy of the cotton factory.

At the beginning of the Civil War, Colonel Scott was made Assistant Secretary of War, and appointed young Carnegie to the charge of the military railroads and telegraphs in the East. Here he did wonderful work, but applied himself so closely that his health broke down and he was forced to retire.

Meanwhile while working for the railroad, the opportunity had come to

Mr. Carnegie at his desk in his New York home

From this time on Andrew Carnegie progressed steadily upward. He never let an opportunity slip by that would prove his quick-wittedness and shrewdness. His employer's respect for him grew day by day.

"I know what you're after, young man. You want my position," Mr. Scott remarked one day, delightedly.

"And I'll get it yet," quoth Andrew, his blue eyes twinkling.

And he did. Some years later, when Thomas Scott became vice-president of the Pennsylvania Railroad, Andrew Carnegie stepped into the place of him to invest in a few shares of stock of the Adams Express Company. Later he had become interested in the introduction of the sleeping-car. Now with greatly increased funds at his command, he became interested in the making of iron bridges to take the place of the wooden ones then in general use. His shrewd mind quickly grasped the opportunity that lay in this new field, and soon the company erected the Union Iron Mills to furnish the iron for the bridges.

A trip to England aroused him to still another opportunity in the substi-

TWO HOMES OF ANDREW CARNEGIE

Andrew Carnegie was born in this little cottage in Dunfermline in the county of Fifeshire, Scotland. What a contrast is his birthplace to the magnificent castle below, where the millionaire now spends his summer holidays. Mr. Carnegie, a munificent giver at all times, has made many liberal gifts to his old and dearly-loved home town.

Skibo, the summer home of Mr. Carnegie, is in County Sutherland in the extreme north of Scotland. Into these highland wilds Mr. Carnegie retires every summer with his family and friends, and there enjoys his isolation. Scotland, however, has honoured him as the Lord Rector of the ancient University of St. Andrews.

tution of steel for iron rails. New iron and steel mills were built only to be enlarged.

He had resigned his position with the Pennsylvania Railroad to take his place in the business world as a manufacturer and financier. A master-mind had come to its own at last. Andrew Carnegie was never again to hold a subordinate place. Besides his general shrewdness, his keen-mindedness at seeing opportunities where others would pass them by, Andrew Carnegie had a wonderful executive ability and a certain directness and winsomeness of character that won him loyal friends wherever he went. In his greatly enlarged sphere his magnificent powers of organisation and management came into play. Only a few years passed and the keen-eyed man, who had once been a bobbin-boy in a cotton factory, was soon directing the movements of mines, railroads and three huge steel manufacturing plants. Not content with this he increased and enlarged his business until he practically held the steel market of America within the hollow of his hand. Andrew Carnegie was a multi-millionaire.

One of his greatest gifts was the power to see ability in others. Young men who showed themselves able and willing were advanced to positions of responsibility and in many cases were given a share in the business. Here they worked hard, making money for themselves, it is true, but also for Mr. Carnegie.

When he was past forty Mr. Carnegie had married, and when at last the opportunity came to him to retire from the business world with a magnificent fortune at his disposal, he decided to accept it. He realised the disadvantages that present themselves to the average man retiring from the arena in the prime of his life, but he had "never approved of a man already rich, slaving for 'mickle muir monie' till the end of his days."

Mr. Carnegie's mind was not a "howling wilderness." In his younger days when he had been struggling upward, he had devoured all the books upon which he could lay his hand, and as soon as he had had more money and time at his disposal he had employed tutors to supplement the self-education of his youth.

While still in business he had begun to write, and now has more than half a dozen books to his credit. The success of some of these has seemed to give him more pleasure than his greatest success in business. The best known of these is "Triumphant Democracy," a study of America.

Before his retirement, Mr. Carnegie had become known as a liberal giver, and his later gifts have been princely. So many and so large are they that they stagger the imagination. Perhaps he is best known as a builder of libraries. He had known in his boyhood the unsatisfied hunger for books, and he determined that, so far as he was able, he would prevent other boys from suffering the same want. No one knows how many libraries he has built in this country and in Europe. Any town which will provide a site and vote a proper sum for the support of a library can secure from him money for a suitable building. There are hundreds of them now open.

He has given a fund of $10,000,000 to pay the fees of poor students in Scottish universities; he has provided a fund of $15,000,000, the interest of which is used to pay pensions to old or disabled college professors, or to their widows; he has founded the Carnegie Hero Fund Commission; he has given liberally to several colleges and universities, and hospitals.

At Washington he has founded the Carnegie Institution for scientific research; at Pittsburgh he has founded the Carnegie Institute, which is one of the best equipped technical schools in the world; he has built at The Hague the Peace Palace as a home for the International Peace Conference, and has given an enormous sum to be expended in helping to bring about the abolition of war; he established a fund to pension the workers in the steel mills from which he drew so much of his wealth. These are only a few of his gifts, and new objects of his liberality are constantly being found.

The beautiful harbour of St. John's, the capital of Newfoundland

NEWFOUNDLAND, THE ISLAND COLONY

WHERE THE CODFISH REIGNS

NEWFOUNDLAND, the first born English colony in America, is an island at the mouth of the Gulf of St. Lawrence, which it protects from the full sweep of the Atlantic Ocean. The island, roughly triangular in shape, with its area of 42,734 square miles, is one-third larger than Ireland. The coasts are everywhere bold and rugged, presenting a high line of broken cliffs, indented with numerous bays studded with countless islands.

THE BEOTHUKS

The earliest known inhabitants were the Beothuks, a numerous and powerful race, who may have been related to the North American Indian. When John Cabot discovered the island in 1497, these people were at the height of their prosperity. The doom of the natives was sealed with the coming of the white man. The struggle which was waged in the mainland between white man and Indian was also carried on in Newfoundland. The destruction was so complete that all we have left are a few skulls, a skeleton, some bones, and a collection of implements in a museum at St. John's.

THE PEOPLE OF THE ISLAND

The population of the island is 239,027, of which one-third is engaged in fishing. The majority of the people live along the southeastern coast. There are few settlers in the interior and the French claims check settlement on the west shores. The inhabitants are chiefly native born descendants of Irish, English and Scotch ancestors.

COD FISHING, THE CHIEF INDUSTRY

The chief occupation of the people is cod fishing. In many villages dried cod serve as money, with which people buy food, clothing and fishing tackle. There are three distinct branches of the industry, the Banks, the Shore and the Labrador fisheries. The Banks lie southward of the island, about thirty miles distant from the nearest land, and cover a great area. To these fishing grounds, which are huge submarine islands, which rise nearly to the surface of the water, the fishermen of France, Canada, the United States and the island go during the fishing season. The grounds are on the "high seas" and therefore subject to the jurisdiction of no country or nation. Schooners carrying from twelve to twenty men sail from the mainland and anchor. The crews go out from the schooner in pairs in flat-bottomed boats called dories. They fish with trawls, which are long lines supported at each end, and from which many short lines with baited hooks hang. Oftentimes a passenger on an ocean steamer is surprised as the fog lifts to see scores of small dories, anchored apparently in mid-ocean. Fogs and storms annually cause the death of many of these brave and hardy fishermen.

OTHER METHODS OF FISHING

Shore fishing is carried on from punts or skiffs. Those fishing from punts use ordinary hooks and lines. The fishermen with skiffs use traps. A trap is an enclosure of netting sunk in the sea and so arranged that the schools of cod in swimming by will blunder into it and become ensnared. The coast fishing is not so good as it was a few years ago. Thousands of fishermen, taking with them their wives and children, leave their homes every June and sail to the fishing grounds off the coast of Labrador. Some live in

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turf huts or timber shacks along the coast, while others live on the schooners. The women and children assist in curing the fish. They fish until October, when they return home with their catch.

THE FISHERMAN AT HOME

A number of little, square, whitewashed, one story cottages nestling in the cliffs overlooking a bay or a cove is a typical fishing village. A score or more goats scamper among the neighbouring rocks, as each household has one or more of these animals. Out into the water of the little harbour are built the stages at which the men land their fish. The cod are scaled by the men as they are caught, but the "splitting," "heading" and "salting" is generally done on shore by the women and children. After salting, the fish are taken to the "flakes" — rude scaffolds covered with under-brush — and there spread out to dry.

The hardy, sturdy fisherman lives, as a rule, from hand to mouth. The season's catch is usually mortgaged to the village merchant, or "planter," who in turn loans sufficient to carry the poor fisherman through until the following October. This process continues from year to year. The boys are reared on the water and at six can manage a sail. After the fishing season closes in October, the men do little besides mend their nets and fishing tackle. They love to tell stories and eagerly wait for the season to open in March. The Newfoundland fisherman, inhabiting more than a hundred such villages, is a hardy, burly, uncouth, warm-hearted, hospitable fellow, a blend of English, Irish and Scotch blood.

DRIFTING ICE BOMBARDS THE COAST

During a considerable part of the year Newfoundland is surrounded by floating islands of ice, often called "ice-pans." These ice floes often take the appearance of strange beasts, as you may see in the picture. The wind and the tide drive them against the shores and the noise is sometimes terrific.

WHY COD ARE SO PLENTIFUL

The reason why the world's greatest cod fishing ground is centred at this island is interesting. The Arctic current which flows past Newfoundland carries with it hundreds of thousands of tons of minute living matter upon which the small shellfish and other creatures of the sea feed. In turn, these become the food of vast schools of cod. It is strange but true that the Arctic seas and rivers, in spite of the

WHERE THE SEA GIVES A LIVELIHOOD

Near St. John's is the quaint little village of Quidi Vidi, where one can see every process in curing and packing fish. Notice the platform upon which the fish are spread to dry, and the towering hills around the little harbour. Every village has its fish platforms, called "flakes."

Newfoundland may be said to live from the sea. The fisheries here are very important, and the chief subject of conversation is the size of the catch. These fish will soon be split open and spread to dry on the platform you see above. Later they will be packed and sold.

Pictures by Brown Bros.

great cold with which they are surrounded, contribute most abundantly to this supply of living slime. Unless this flood from the Pole is stopped, the fishermen cannot lessen very much the supply of cod. Uncountable millions of cod will continue to come from the darker recesses of their unknown deep-sea homes and throng the Banks and shallower waters where conditions are suitable for breeding and where an abundant supply of food is found.

Cod-liver oil and other things

All parts of the fish are used. Cod-liver oil is extracted from the livers. Glue is made from the skins while the heads and entrails are used for the manufacture of fertilisers. Great swarms of herring arrive along the coast during the early part of September. Great quantities are used as bait for cod, and packing of herrings for food is fast becoming an important industry. Several lobster canneries are doing a thriving business along the southern coast. The sealing industry is not so important and profitable as it was a few years ago, yet every spring several vessels leave St. John's for the sealing grounds of the North.

The Newfoundland dog, of which you have all heard, has almost died out on the island. It is supposed to have developed from a cross between the sledge dogs, which are closely related to the wolf, and other dogs brought from Europe.

Minerals and forests

Newfoundland is a treasure house of minerals. There is scarcely a man who cannot show you on his mantel-shelf a specimen of the copper, iron, nickel and even gold ore of his neighbourhood. Several thousand tons of copper and iron are produced yearly, but the industry is only in its infancy. Various mines of coal, asbestos, nickel, lead, and gold in different parts of the island are in various stages of development, and give promise of becoming properties of great value. Along the coasts and in the interior are large tracts of heavily-timbered land. Lumbering operations are extending rapidly. Recently several large pulp mills were erected and it will be only a short time before the island will export great quantities of pulp.

Farming and manufacturing

Farming has not been followed to any extent. Out of a large area of over five million acres of tillable land only one hundred thousand are under cultivation. The people do not care to work in factories and are not adapted to such employment.

The towns

St. John's (32,292), the capital of the island, is on the southeast coast and is situated on one of the finest natural harbours in America. The city is entirely devoted to the fishing business. Harbour Grace (8,000), Carbonear (4,500), and Bonavista are the only other towns of importance.

The government

The island has not yet consented to join the Dominion of Canada, and the British Government still appoints the Governor. There are two chambers, the legislative council of fifteen members, appointed for life by the government of the day, and the legislative assembly, consisting of thirty-six members, elected for four years by ballot under manhood suffrage. The executive government is a ministry responsible to the legislature and holding office so long as they command a majority in the assembly.

The government of Newfoundland also controls the coast of Labrador, that strange, desolate, thinly-populated country which deserves a whole article itself. Perhaps you have heard of the work of the medical missionary, Doctor Wilfred Grenfell, who is devoting his life to the improvement of the lot of the fishermen there.

The possession of so many useful minerals, such vast tracts of forests, such large areas of fertile plains makes Newfoundland a country most favourably equipped for mining, lumbering, agriculture and manufacturing. With capital, enterprise and labour the island is destined to become a great producing and exporting country.

THE SPIRIT OF CANADA

CANADA of to-day is a far different country from Canada of yesterday, and the Canada of to-morrow is destined to become a great and mighty nation. For a century and a half the history of Canada was one of internal conflict between rival races and foreign flags. It was not until the nineteenth century that we find the beginning of constitutional history. It is difficult for the Canadian of to-day to comprehend the situation in those older days. Newspapers were so few as to be of little influence. Books were scarce, high-priced, and of a character not intended to throw light upon existing problems. The people of lower Canada were wrapped up in the traditions and the surroundings of many years before, and under the British flag were dreaming of the ideals of Old France in the days of Louis XIV, and of New France in the time of Frontenac. The people of the English provinces were little more than isolated pioneer settlers steeped in the shadowed memories of a past struggle for King, institutions and country. They were embittered against all democratic tendencies and prejudiced against the Radicals of England, who had assisted in ruining the royal cause in America, as well as against the French of Quebec, who had been so long the traditional enemies of England and the sincere foes of British supremacy in North America.

From this mass of different interests and opposing feelings came the Parliamentary system. It was not asked for but was given from without. The French Canadians accepted it as a part of the new situation, while the English did not really want to govern themselves, but would have been satisfied for many years to come with able governors and efficient local advisers. Still the latter knew how to use it when received, and were more or less familiar with the principles of free government. The increasing population had different political ideas and soon a struggle arose between the English settlers and a large number of the people who cared more for the present than the past, and more for liberty than memories of royalty. From this struggle came the Rebellion of 1837 and later the conflicts ending in confederation.

Democracy, as time progressed, got a firmer hold upon the people, until to-day the people rule supreme. The rule of the people by the people and for the people is recognised as the only possible principle of government for Canada.

The political leaders have greatly changed in character as the country has slowly broadened from a colony into provinces, from provinces into the Dominion, and from the Dominion into a British nation. For years the English leaders strove to imitate English manners and customs, while the French continued to dream of the past. Canada, as a national idea, did not exist, but as years advanced, the result of feelings, thought and action began to present itself. Under the fostering care of Sir John A. McDonald and Sir Wilfrid Laurier this had grown into a strong Canadian sentiment which had destroyed the old tendencies known as French or English.

The French Canadians no longer feel that their future is wrapped up in Quebec and the past, but they realise that they as Canadians are interested in everything that promotes the interest of Canada. The process of welding all classes into a closer union is being carried on by Premier Borden.

During the past few years, there has developed throughout the British Empire a strong imperialistic feeling. This is directed towards binding together with closer ties the motherland and her colonies. If Canada is to continue as a part of the British Empire, it will not be as a colony but as an independent nation. To the world Canada is still a dependent colony possessing a destiny to be worked out. To the Canadians, she is an independent nation, but instead of putting on the cloak of independence she prefers to develop her resources and to work out her destiny with England as her closest and

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dearest ally. In internal as well as foreign matters Canada is practically independent. The willingness of England to grant this independence has bound the country closer to the motherland.

The realisation by England that her possessions are no longer colonies but independent nations, and her treatment of them as such, is binding the Empire closer together. Canadians generally do not entertain the slightest thought of breaking from the Motherland. Suggestions of independence pass unnoticed as the people have no interest in them. Canada is content to remain with the Empire, and it is her ambition and desire to work out her destiny in close connection with the Motherland.

The sentiment which has developed in Canada is strongly Canadian in character. The imperialistic feelings are steadily growing in strength. The Canadian sentiment is peculiar in combining American democratic tendencies and sympathies with a fervid loyalty to the British Crown. The continuance of such close ties is very important to Great Britain, from the fact that the Canadians hold the important point in territory and power in the British Empire, and that upon the continued loyalty depends not only the unity of the imperial system but British control of the waterways of the Atlantic and the Pacific.

Canada lies in the great pathway of commerce; her transcontinental lines furnish the shortest routes around the world. Only a small part of the millions of acres of rich agricultural lands are under cultivation. Either wheat or traffic would make Canada a very prosperous nation. The inland water courses are being improved and then development will have a great influence upon transportation. Future generations may witness the unique spectacle of vessels from European ports loading from the elevators at Winnipeg or cruising for hundreds of miles up the Saskatchewan for cargoes of grain. This is an alluring prospect and one that Canadian pluck and enterprise may bring. The waters of Canada apart from the soil are the greatest and most valuable undeveloped resource. More valuable than minerals, because properly conserved, they will never be exhausted, but on the contrary, they can be increased. Water power will be the most important factor in Canadian progress and industrial development. Canada possesses all the metals and minerals that mankind uses, but the wealth of her mines has scarcely been touched. Her fisheries, ranking with those of any other country, are yet in their infancy.

Her thousands of square miles of forests under proper care and management will ensure unlimited wealth for the future. All these conditions assure for Canada the foremost rank as a producer of raw materials and as a manufacturer of finished articles.

Canada has learned a valuable lesson from the great producing nations of the world. Everywhere else the policy of protection of natural resources was not developed until these resources had been largely exhausted.

In Canada the people have in time realised the importance of protection of the great natural wealth of the country, and much has been done by legislation to protect and help the development of the natural resources. The people know the importance of legislation dealing with the protection and the promotion of material wealth and the comparative unimportance of mere party conflicts.

The four hundred years of Canadian history which has gone into the making of the Dominion are of a nature to stamp its future with every fair prospect of success. The position of the country, the extent, the resources, the unity and the transportation facilities should make the wealth and the commerce of the future as certain as the aspirations of the people are strong. The loyalty of the people to Canada and to the Empire ought to make its place in the imperial system more defined in the future than has ever yet been possible. Canada for the Canadians within the Empire and against the world seems to be the popular sentiment.

A new life-saving dress in which submarine sailors can float to the surface

CONTINUED FROM PAGE 6244.

DOWN IN THE DEEP, DEEP SEA

In the caverns deep of the ocean cold,
The diver is seeking a treasure of gold.

How can he seek this treasure? It is because he wears a sort of armour, which keeps out the water and brings him air from above.

The diver's suit of rubber and canvas covers his body from feet to neck, but leaves his hands free, his sleeves ending in water-tight cuffs at the wrist. He puts on a heavy helmet with windows, which fastens to the neck of his suit. This helmet has a valve attached to a pipe, through which comes the air pumped from above. A second valve in the helmet lets out the air which has been breathed. In order that the diver may sink down into the water, his suit is "padded" back and front with plates of lead, while his feet are weighted with metal, so that altogether his clothes weigh about 150 pounds.

The deepest that a man has ever been known to dive is 204 feet, but men seldom go down more than 100 feet. The deeper down we go, the greater is the pressure of the air. A man who goes down a hundred feet has to breathe air at four times the pressure of the ordinary atmosphere. The result is that the air taken into the blood is forced by the pressure into froth and bubbles, and some of the tissues of the body give off this air very slowly, so that if a man comes up suddenly many of these bubbles remain in his blood. This may cause paralysis or death. To guard against this, a man has to take as long a time in coming up out of the water as he has been down.

Divers are carried by every man-of-war. If anything goes wrong with the ship below the water-line, the men put on their dress, go down with tools, and repair the damage. One kind of diving suit has attached a cylinder of compressed air.

Another invention, for submarine vessels, is a strong helmet and a water-tight jacket. In the jacket pocket is a substance which, on coming in contact with the sailor's warm breath, gives off oxygen, and so acts that the poisonous carbonic acid from the man's breath is absorbed. By this means, the air inside the helmet and jacket can be breathed again and again. The submarine sailor, in case of accident, puts on this dress and floats to the surface, when the dress acts as a life-buoy, keeping its wearer afloat until he can be rescued.

THE DIVER PREPARES TO GO DOWN

The diver's dress is the result of centuries of experiment, and enables a man to keep under water for five or six hours at a time. The dress consists of a waterproof garment, heavily weighted, massive, heavy boots with leaden soles, and a metal helmet. Here the divers are beginning to put on their costume.

After the diver has put on ordinary clothing, he is helped into the waterproof garment, which covers his whole body, except head and hands. He needs warm clothing, as it is cold working under water.

In this picture the diver has on the waterproof garment and the heavy boots. The rope by which he will be lowered is in position round his waist, and he is about to have the helmet put on his head.

TALKING TO A MAN DOWN IN THE SEA

These pictures show the diver going down into the sea, and a man talking to him by telephone. The diver's helmet has three glass windows, and is fitted with valves, so the air he has breathed can escape. Fresh air is supplied through a tube that connects the helmet with an air-pump worked from above.

The diver's costume weighs about 150 pounds, but so buoyant is the water that he has to put his feet under the ladder rungs to pull himself down.

Communication is kept up by means of the telephone. One bluejacket is here speaking to the diver, while the other is working the air-pump.

THE MEN ABOVE AND THE MAN BELOW

In this picture the diver is working under the sea, while in the ship above one man holds the rope by which he is raised, another has charge of the air-tube, and a third is telephoning to the diver. The greatest depth to which a diver has been known to descend is 204 feet, but divers can rarely work farther down than 100 feet. A complete diving costume, with all the necessary apparatus, costs several hundred dollars, but this is cheap, considering the valuable work the diver does.

The photographs on these pages are by Stephen Cribb, and others

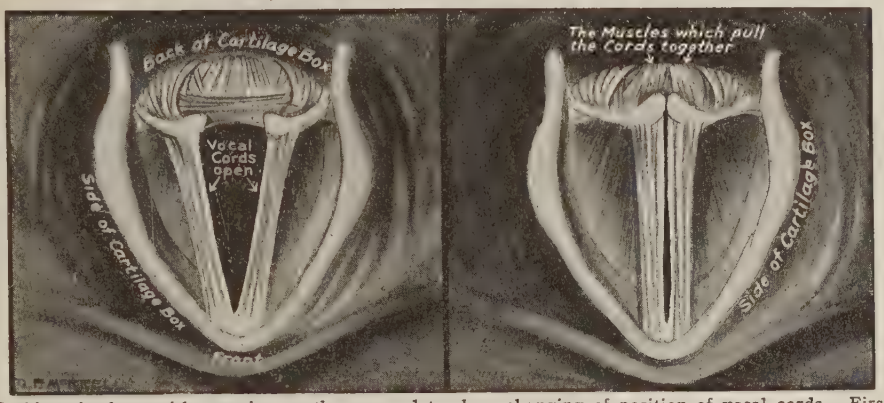
THE DIVER COMES BACK TO THE BOAT

On this page we see how a diver works from a small boat. There is no telephone, and the diver communicates with those above by signalling with a rope. The diver gets to the place where he wishes to work either by descending a ladder that hangs over the side of the boat, or by being let down by a rope.

The diver is pulled to the surface by the rope round his body. The invention of diving apparatus has led to the recovery of a vast amount of treasure. From one ship alone that foundered in sixty feet of water, nearly $1,000,000 was recovered in a few years. In the latest kind of diving dress the diver carries a cylinder of compressed air on his back, and is independent of help from above.

THE BELL THAT RINGS UNDER THE SEA

This shows the best means of warning a ship in foggy weather. By means of electricity, the lighthouse-keeper rings a bell under the sea. The ship has inside its hull on each side a microphone, which collects the sound of the bell as it passes through the water in the direction of the dotted line, and magnifies it. A wire connects each microphone with a telephone receiver in the wheel-house, and by turning his ship until he hears the bell equally loudly from each microphone, the captain is able to point his ship towards the bell. His chart marks the position of the bell, and he is thus able to know exactly where he is.



Jack's voice-box, with covering partly removed to show changing of position of vocal cords. First picture shows an opening for breathing, the second the cords forming chink for singing high note.

CONTINUED FROM PAGE 6255.

JACK'S WIRELESS TELEPHONE

THE BOX IN WHICH HE KEEPS HIS VOICE

We remember that, as the air went down to ventilate Jack's house, it had to pass through a very narrow place, which was opened to let it go by. That place has no use at all, so far as the ingoing air is concerned, though it is true that Jack can make noises, and even speak, by means of his ingoing air; but that is very tiring to Jack, and still more tiring to the people who have to listen to him. The real business of this narrow place, and the voice-box that holds it, is with the air as it comes back from Jack's bellows. This air, we remember, is rather warmer, and much moister, than it was when it went in; it contains less oxygen, more carbonic acid gas, and just the same amount of nitrogen.

Other creatures can make more noise, and more alarming noise, and can keep up their voices for a longer time; but no other creature has anything to approach the voice-box of Jack's house for the beauty and the variety and the expressiveness and the usefulness of the sounds it can make. Perhaps, however, if the truth were told, the credit of this goes less to Jack's voice-box than to the wonderful group of head-servants living in the upper part of his brain.

Now, before we describe this voice-box, we must understand what it really is, and what it enables Jack to do. We know already that his house, like some great office or hospital, has a magnificent telephone system of its own, by which all its parts can communicate with each other. We already know very well that it has millions of little batteries called nerve-cells, and that these nerve-cells communicate with each other, and with every part of Jack's house, by means of a wonderful kind of living wires called nerves. These nerves do undoubtedly play exactly the part of wires: messages run through them; they direct the course of the messages and keep them to themselves. If they are cut, the messages cannot travel; and they are definitely of two kinds — one carrying messages only from Jack's brain *outwards,* and one carrying messages only *inwards* to the brain.

But an office or a hospital not only needs its own private telephone system, but also requires some arrangement for communicating with the

outside world. It requires a machine for sending messages, and it requires also another kind of machine, called a receiver, for taking in messages. Now, if an office or a hospital requires such arrangements, much more does Jack's house. Any other kind of house may get along by itself, but Jack's house cannot. It was made and meant to be one of many, all living together, and helping one another, and communicating with, and serving one another.

THE TELEPHONE THAT IS ALWAYS MOVING

It follows that the arrangements for sending and receiving messages are of the first importance in Jack's house; and here a difficulty at once arises. Ordinary houses stand still where they are built, and there is no particular difficulty in setting up machines in them with wires by which the occupants of the houses can speak to each other and be spoken to. But we could hardly have a telephone put into our house if it were constantly walking and running about, and might any day make a journey of a hundred or a thousand miles.

There are, of course, such things as wireless telephones, and people can talk to each other by means of telephones at great distances without wires, just as they can telegraph to each other. What happens is simply that the electric waves, which, in other cases, run along wires, in this case run through the air in an invisible kind of something we call the ether. This we consider exceedingly wonderful, but it is really one of the oldest things, and we all do it every day.

WHAT JACK'S VOICE-BOX REALLY DOES

We all have in our throats a marvellous machine for making waves, which need and have no wire, and with this machine we daily telephone — which means "speak at a distance" — to each other; and we also possess a much more wonderful receiver, called the ear, which catches these waves, and then sends an account of them to our brain by means of certain of the wires that go to make up the *inside* telephone system of Jack's house. Now we have some idea of what Jack's voice-box really does, and we can proceed to see how it does it.

Of course, it is not always in action — if Jack has any sense. Yet when it is not in action it must always be on its good behaviour, for air is for ever needing to pass through it, whether or not it chooses to make use of the air on its own account.

This wonderful voice-box, or larynx, the message-sender of Jack's wireless telephone, is made up of a number of separate pieces of cartilage, or gristle, a firm, fairly stiff substance which is not bone, and yet is rather like it. When Jack's house grows very old, these pieces of gristle are apt to get too much lime in them, and become more like bone than they should; and this is probably the chief reason why the voices of old people change, and become weak and shaky.

WHEN JACK'S BOX GROWS MUCH BIGGER

When these pieces of cartilage are put together they make a kind of box, which we can readily see and feel in the throat, and which is sometimes called Adam's apple, because of the stupid idea that it is the apple that Adam swallowed, which stuck in his throat. It is true, however, that this "apple" is much bigger and more noticeable in men than in women, and that is why men have stronger and deeper voices than women.

When Jack and Jill are children their voice-boxes are very small, but at some time in their teens their voice-boxes, especially Jack's, grow much bigger. This happens so quickly in Jack's case that, for a time, he loses control of his voice-box, and his voice is likely to break, and sound sometimes high and sometimes low without his meaning to make the difference. Also, if he has been a singer, his pure child-like high notes begin to go, and gradually he gets deeper notes which he never had before.

When the voice-box has grown up, so to say, we can readily feel in our throats the largest of the cartilages, which projects forwards, and beneath it we can feel a regular, strong ring, which is the lowest of the cartilages, and supports the others.

But we can really learn nothing about this voice-box until we look inside it. About half a century ago an inventive Spaniard, a great teacher of singing, called Manuel Garcia — who died lately, more than a hundred years old — thought he would like to be able to see the inside of his own voice-box, and he actually invented a little mirror which can be passed into the back of anyone's throat, and with which can be seen reflected the inside of the person's voice-box. Garcia invented this laryngoscope, or larynx-seer, because he wanted to learn about singing; but, somewhat improved, it has become a valuable invention for doctors, enabling them to save many lives and voices and relieve a vast amount of pain.

THE CORDS THAT HELP JACK AND JILL TO SPEAK

What we see with the laryngoscope is a pair of vocal cords. When these are quite well they are pale white to look at, and they move together, towards or away from each other, quickly and easily and equally; so that the space between them is always exactly in the middle of the larynx, and that means also exactly in the middle of Jack's house. If one cord were moving badly, the other would come across to try to meet it. Also, if Jack has been talking too much, or has been smoking too much — a very common reason — and also in people who drink too much, the cords are not pale white, but slightly reddish, and then the voice is husky, and soon gets tired.

The cords are made of pure elastic fibres, covered by a layer of smooth, flat cells. In front, as the picture shows, they are attached close together behind the front part of the big cartilage which we can see and feel so easily.

But each of the cords is attached behind to a corner of a little separate piece of cartilage, and each of these pieces of cartilage is so posed that it can rotate and twist upon itself. When it twists in one direction, it carries the end of that vocal cord towards the middle of Jack's throat, to meet the other cord. In health, both cords always move together, and so in this case the cords will almost meet — not quite, but very nearly. Every time Jack speaks or sings, this is the first thing he does; and if he cannot bring his cords close together like this he has lost his voice, and can only whisper.

WHEN JACK SHOUTS AT THE TOP OF HIS VOICE

But when the piece of cartilage that carries the back end of its vocal cord twists on itself in the other direction, it carries the cord away from the middle, and away from its fellow. Both little cartilages do this together, and now what was before a narrow chink becomes a triangular opening that readily lets air through in either direction, without producing any sound.

Our business now is with what happens when Jack puts his vocal cords together as the air is coming out of his chest. In the first place, he does not content himself with letting the air come out by the elastic recoil of his stretched lungs and ribs and muscles, as he usually does. That would not give him enough force for his purpose. On these occasions he makes a "forced expiration," deliberately squeezing his chest, so as to make the air come up his windpipe with unusual force. The harder he squeezes, the more result he will get, and when he shouts or sings as loud as he can he is squeezing his chest to its utmost possible extent, short of blowing his vocal cords apart and spoiling everything.

THE WAVES THAT SPREAD IN ALL DIRECTIONS

But he does more than this. Not only does he bring his vocal cords together, but he also deliberately makes them tight. The cartilages to which their back ends are fixed sit on the top of the ring cartilage, which is shaped at the back exactly like a signet ring, and has a wide space for them to rest on. Now, when Jack thinks fit, he can tilt these little cartilages backwards so as to make his vocal cords tight; and then, if a current of air is pressed hard and suddenly against them, they have no choice but to vibrate, or tremble, like any tight string you might pluck with your finger.

Thus Jack's wireless telephone produces air-waves — commonly called sound — which leave his house, and

may be picked up by any receiver, such as the ear of a man or an animal, or the receiver of a phonograph. These waves, like the waves of other wireless telephony or telegraphy, spread in all directions, and cannot be directed beyond a slight degree, because there is no wire to confine them.

THE TINY THINGS ON WHICH THE BEAUTY OF SPEAKING DEPENDS

The pitch of the sound depends on the number of waves produced in a second, and that depends entirely on the tightness of Jack's cords. It differs in different people, because some have heavier and longer cords, and these will always vibrate more slowly, and make lower-pitched sounds, however tightly they may be pulled. But, in any particular case, the higher notes will be produced when Jack tightens his cords, and the lower notes when he relaxes them. He does so all the time, when he is speaking as well as when he is singing. Listen to anyone speaking, and you will hear how the pitch of his voice rises and falls, differently at different times; so that, for instance, you could tell by the change in pitch that he was asking a question even if he were using a language, such as Spanish, that you did not understand. Half the beauty and interest and expressiveness of speaking and reading aloud depends on these changes of pitch — which depend on the use of a tiny pair of muscles, and a special pair of nerves.

HOW EVERY PART OF THE HOUSE HELPS JACK TO SING

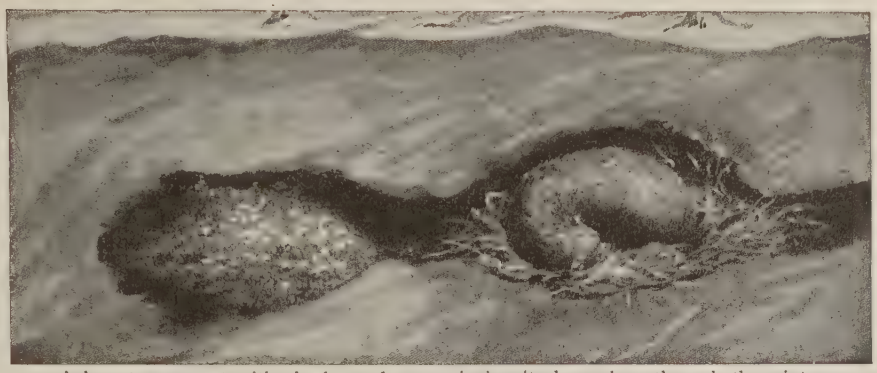
In great singers this power is marvellous. They can control the pitch of the voice within wide limits, at their will; they can maintain the clearness and beauty of the tone equally when they are scarcely sounding any note at all and when they are singing their loudest; and they can alter, also, the quality of the tone in order to express different kinds of feeling.

But it is not to be supposed that the voice-box itself, without any help, is equal to all this, much less to producing words. On the contrary, every neighbouring part of Jack's house is called on for aid when he speaks or sings. When he alters the pitch of his voice, he can feel that his voice-box rises or falls in his throat. When he speaks or sings deep and loud, he can feel his whole chest vibrating and helping to make the sound what it is. His whole throat is at work, too. Indeed, when he first learns to sing he uses his throat too much and strangles his voice, and people say he is a "throaty" singer. His tongue is always at work, either lying low and smooth in the floor of his mouth, or moving about to make the vowels or consonants. His lips are at it, too, as deaf people well know, when they learn to read the lips because they cannot hear. His soft palate, at the back of the roof of his mouth, rises and closes the back of his nose, so that he does not produce a nasal tone; and in good singers, when they sing high and loud, if we put our fingers on their nose or cheek-bones, we can feel them all vibrating and helping the sound, just as the chest does with the lower notes.

THE MACHINERY THAT WORKS TO PRODUCE LANGUAGE AND MUSIC

All this complicated machinery works together with exquisite ease and skill and harmony whenever we speak or sing properly, and it produces either the universal language called music, which can express things, like joy or sorrow, that all can understand; or else it produces a special set of waves — and interruptions to the waves, which are called consonants, like p and m and t — which form a code or set of signals, called a language, just like the code used in ordinary telegraphy. Our native language seems "natural" to us, because we grew up with it; but really it is a quite artificial and specially invented code, and we show this when we criticise any code we don't understand — though it is probably just as good as ours — and call it "gibberish." The only exception to this is that a few words in all codes are not really artificial, but are more or less imitations of the natural sounds — such words as whisper, and buzz, and tinkle, and coo, and so on.

Such, then, is Jack's wireless telephone, although as yet we have only described the least part of it.



A hamster — a rat with cheek pouches — enjoying its long sleep through the winter

CONTINUED FROM PAGE 6274.

THE WINTER SLEEP OF ANIMALS

A BUTTERFLY was born one day, and saw a world beautiful with sunshine and flowers and fruit. The air was sweet with perfume, the flowers were heavy with nectar, the world was a paradise for butterflies. And our butterfly danced and floated in the sunlight, and retired in the evening to the shelter of a splendid tree. The butterfly laid its eggs, and died. Its whole life lasted but a few days. To such a butterfly our world is always sunny and warm; always full of flowers and fruit. Now, how many of us realise that there are animals which live far longer than man lives — animals which know nothing but summer?

In a famous zoological garden an animal was shown, a few years ago, which had slept about two hundred years in all. The animal in question was an elephant tortoise, the age of which at the time of his death, in 1906, was over 350 years. Now, he would sleep at least twelve hours out of each twenty-four during the summer. But that did not satisfy him. As soon as the dull days of autumn came, the tortoise put himself to sleep, not for the night, but for the whole winter. And during all his long life — a life as long as the lives of six men — he never saw a winter. This tortoise was not different from the rest of his family. Every year he hibernated — that is to say, he passed the winter hidden away, and in sleep.

The long sleep of animals in the winter is one of the wonderful precautions which Nature provides for her children of the wilds. We might say that it is natural for a cold-blooded animal like the tortoise to go to sleep for the winter; that it is so sluggish an animal at the best that to change to a state of complete torpor or sleep is but a little step. But animals much more active than the tortoise go to sleep for the whole of the winter months.

When we read of travellers in the Arctic regions, we know that in the depth of winter they may come across the great Polar bear. Naturally, then, we say to ourselves that Polar bears do not hibernate. We are both right and wrong. Male Polar bears do not hibernate. They take their nightly sleep as we take ours, but they are always active in pursuit of food during the day. The mother Polar bear, however, goes to sleep for the winter. She lies down in the snow, and lets the soft, feathery mantle cover her. Her warm breath keeps open a sort of funnel for her through which she can breathe. Far down in the snow as

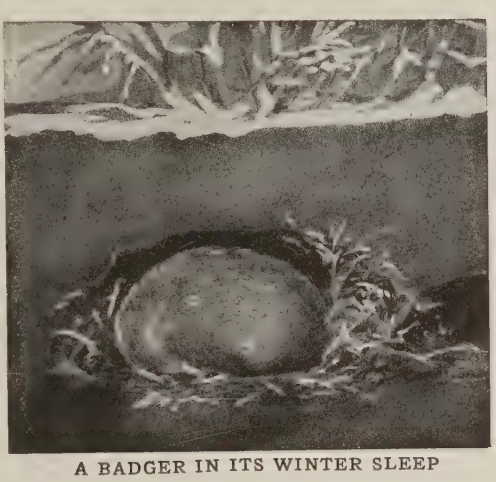
she may lie, there is always open a way to the upper air from which she can draw supplies of oxygen to keep her blood pure. And there, through all the winter days and nights, she lies. Winter comes and goes, and in due course the spring-time arrives. Then forth from her bed of snow comes the mother bear. And when she does go out, she does not go alone — she takes with her a baby bear, or, it may be, two baby bears, whiter and fatter and jollier than the finest Teddy bear that ever became lord of a nursery.

A POLAR BEAR SLEEPING THROUGH THE WINTER

But let us not forget that there are many other bears besides those of the Arctic regions, and many of these also hibernate. They do not bury themselves in the snow, but they find some other refuge. It may be the hollow trunk of a tree, or it may be some snug cave. All hibernating animals must, before settling down for the winter, find some suitable place. It would be of no use for them just to lie down the moment Nature told them that the hour was at hand for them to begin their winter sleep; they would die of cold, like ourselves, if they did not take precautions. They seek the right sort of shelter — some enclosed place, where the cold wind will not blow, and where the temperature will not vary. A mysterious knowledge which they have spurs them to do more than find out this shelter. As the autumn draws near, the bears eat and eat and eat, not because they are desperately hungry, nor because they are greedy. They eat that they may become fat. During the winter months, when they are lying like dead bears in their retreats, they will require some sort of nourishment to retain life in their bodies. That nourishment they find in the masses of fat stored up in their bodies by the process of heavy feeding which they have undergone in preparation for their long fast in the winter months.

He knows that he must be fat at the

beginning of autumn when he tucks himself up in his cave or tree, or he will die, and so well does he understand this that, if times have been hard with him, and he has not put on a great mass of fat, he will not risk going off for his winter sleep. Woe to us if we come across him at such a time. We ourselves are bad-tempered if we lose our sleep, but we are not as bad as the thin and angry bear which wants to sleep. That is the time when he is to be avoided. Another time is when he wakes up from his winter sleep. Then he is a bad-tempered fellow indeed. All the fat in his body has been absorbed during the winter; he is lean and hungry, and his fur is also matted and unlovely, and he is as bad-tempered as any bear could be. But leave him alone, and he will come round. He will find roots, tender shoots of trees, honey, perhaps a few animals, and in a month's time his fur will have become sleek and fine.



A BADGER IN ITS WINTER SLEEP

The badger belongs to a species which, in colder lands, passes a good deal of the winter in sleep. In this it is like the brown bear. Brown bears and badgers partly hibernate — that is to say, they have long spells of winter sleep, without passing all the winter in this way. These animals now and again bestir themselves to go out and get food. Forth they go, get a meal as best they can, then return to their lair and sleep for weeks. Even the common English hare hibernates to some extent. It can lie and snooze for days, or even weeks together, in the snow in the fields, and feel none the worse for the adventure. The scientist would not call this true hibernation, for the hare, like the Polar bear, keeps open a funnel in the snow by means of its warm breath. The scientist insists that an animal, to hibernate, shall be in a state of complete torpor; that it shall be to all appearance dead.

An animal in this state is one of the greatest mysteries in the world. The breathing practically ceases, the heart beats faintly; the temperature, or bodily heat, of the animal sinks to the temperature of the place in which it lies. Great cold numbs us, and makes us fall asleep — to die. But great cold awakens the hibernating animal. The sleeper is recalled to life, as it were, by a sudden fall in temperature, and if it is not able to move about and get food, or in other ways increase the heat of its body, it will die, frozen to death, like the weakest of us. A rise in temperature will also recall the unconscious animal from its deep slumbers.

The bats hibernate in the truest sense. If we were to take a bat in the middle of summer and plunge it into water, we could soon drown it. But when a bat has fallen into its winter sleep we can place it in a bucket of water and keep it there for nearly half an hour, and it will know nothing about it, and be none the worse for the drenching. Every boy who has handled a sleeping hedgehog in summer knows that if we disturb it when it is sleeping ordinarily it will give a little snort or two, wriggle, then coil itself up tighter than ever, being quite awake.

When its winter sleep has started, however, we can do as we like to it without awakening it. It seems scarcely to breathe. When we try to rouse it, it will give one or two snores, then breathe feebly a few times, and become as quiet as if dead.

In winter we might handle some deadly snakes without the least risk of danger to ourselves, but others, awakened from their torpor, would be as deadly as in the summer-time. There

is plenty of opportunity for studying hibernation if we keep reptiles, for they all go to sleep for the whole winter, provided that the conditions in which we keep them resemble the conditions under which these animals live when at large. Rattlesnakes are said to travel for miles, in the autumn, back to the old home where they were born, so that all the members of the family, no matter how far they have wandered during the summer in search of food, may be together for the long winter sleep. But who would care to handle rattlesnakes, even though they were asleep? Some of the deadliest vipers when aroused in the winter are quite harmless; their "poison" is not poison at this time, but as other poisonous snakes are poisonous winter and summer, we should not care to experiment with the rattlesnake when he is waking up in a bad temper.

A young bat, life-size, picked up in the Surrey lanes at Ewell, near Epsom

We can get ample evidence as to the ways of hibernating animals from our common neighbours, the frogs and toads. These sleep soundly through the most severe winter, but they are too wise in the choice of their hiding-places for us to find them easily. When chill autumn comes the frogs betake themselves to their ponds, dive down to the bottom, and bury themselves in the mud. Should we by any chance come upon a hibernating frog, he will swim lazily away, but will soon settle down again to resume the nap which we have disturbed. It is easy for any cold-blooded animal thus to pass the time in sleep. A reptile does not have to undergo so violent a change of temperature as a warm-blooded animal. A lizard makes itself at home for the winter in various places — under stones, among dead leaves, in holes and trees, and so forth. Tortoises bury themselves for their winter sleep.

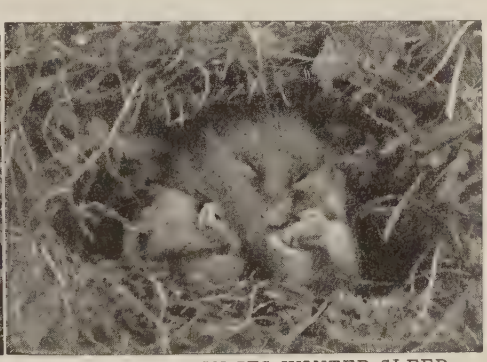
Lower in the scale of life we find the same habit practised. Snails and slugs are profound winter sleepers. Slugs go to sleep in holes in the ground, and worms make their winter beds deep enough in the ground to escape the effect of frost. Snails, however, take a double precaution. They have their holes in the ground, but they are skilful enough to make a special protection for themselves. They close up the hole in their shell, but, as they must still have air, they leave open a tiny hole in this covering. It is hard to say how long they can support life in these conditions. A snail from Egypt, called Helix desertorum, lived, gummed to a board, for four years. It then revived, and lived in a museum for two years after awakening. Hence

BATS DURING THEIR WINTER SLEEP

we need not be surprised to learn that fresh-water snails have the power of hiding away and remaining without food all the winter months. Some fishes hide themselves in deep holes or in the mud, and remain in a torpor while winter lasts.

Many insects hibernate. But here we come to a parting of the ways, as it were. Are we to call the life of the chrysalis during the winter a hibernation? Some insects lay two or three lots of eggs in the course of the summer. The earlier lots will all be hatched during the same summer, but the later will remain either as eggs or as chrysalises during the time of cold and absence of food. That is true of flies and many moths and butterflies. But we see butterflies on warm days in winter.

A HEDGEHOG IN ITS WINTER SLEEP



A DORMOUSE IN ITS WINTER SLEEP

True, there are some butterflies hardy enough to brave the cold days of winter. During frost and fogs and snow and rain they hide away in warm places, depending for life on the store of nourishment contained in their fragile bodies.

When the sun shines and the wind is warm, out they come, fluttering like winged sunshine in the wintry air. A very little suffices to feed them, and we are all glad, for the sight of a butterfly in winter is cheering.

It has taken the experience of thousands of generations to teach animals that it is necessary for them to go to sleep during the winter. Those animals which hibernate know their business better than we can teach it to them. Certain bats go off to bed for the winter at the end of July, when their food is still plentiful. That seems unaccountable to us, but that there is a good reason for it we may be sure from the fact that year after year the bats retire at about the same time. Probably the reason is that they have had all the food necessary to build up their bodily strength; to continue to feed might be useless, perhaps even harmful.

Let us glance at the methods of some animals that hibernate on less severe lines. Our pert and handsome friend, the squirrel, is one of them. We already know how he stores up food for the winter, then tucks himself up in bed and goes off to sleep. But warm days of winter wake him up, or the action of his heart and muscles, which consume the fat stored in his body, does so. He wakes up, pops out to his store of nuts, and makes a good meal, then curls himself up for another long snooze in his delightfully warm little abode.

American marmots actually make hay and store it in summer, so that they may have abundant food during the winter. There are many species of marmots, and we can find something to admire in the wise ways of each. Those whose homes are in Europe and India make but little preparation, for they know that they will be able to leave their underground towns early in spring, and come out for food. Others lay up store for a long stay underground, so that as often as hunger awakens them they may have sufficient food in their little barns without having to go out and face the cruel weather. The chipmunk or ground squirrel knows that winter is a hard time, dur-

ing which he must shut himself up in his subterranean city. How well he provides against that time we may know from what was found in the winter home made by four chipmunks. There was a quarter of a pint of wheat, a quart of nuts, a peck of acorns, two quarts of buckwheat, a lot of corn, and a quantity of grass-seed. And this was to feed four fat chipmunks in the little intervals of wakefulness throughout the winter. Need we wonder at all that when they come out from their long winter sleep the chipmunks are as fat as butter?

It is from necessity, then, not from choice, that the animals of which we have been talking take these long winter sleeps. Long as it has taken them to learn that they must accustom themselves to such a mode of life, they very soon shake off the attractions of a winter-long sleep if their conditions of life alter. As we have seen, frogs go down into the mud to sleep. But if we like we can keep a frog awake all the winter. We have only to keep him moist and warm and feed him, and he will not want to sleep night and day.

We know that men kept in a temperature equalling that of their own bodies, and doing nothing, can go without food for a long time. It is only at the beginning that hunger and thirst are felt; afterwards there is generally only a desire to sleep. Of course, if a man were moving about, or doing work, the case would be quite different; he would soon die. But keeping still in a warm place with pure air, a man can live many days without food or water. If a man can do this, we need not be surprised that cold-blooded animals like reptiles and amphibia and fishes can pass a winter without food.

It is not so easy for an animal which needs occasional meals to hibernate. It is hardest, of course, for the flesh-eating animals. They have never yet learned to store up food for the winter, except in the case of the Arctic fox, which does hide the bodies of captured animals, to be eaten when he wakes up now and again during the winter. It is wonderful that even a little animal like the Arctic fox should be able to make this provision. Of course, it would be impossible for a great bear to lay aside enough to keep himself fed during a long winter. He knows that, so he goes to sleep entirely, and eats nothing, making himself, by so doing, one of the greatest wonders of animal creation. Hibernation is a mysterious and fascinating subject, and there is still a great deal to be learned about it even by wise men.

The summer sleep of some animals is not such a simple matter for us to study. We have all noticed that on a hot summer day a heavy, drowsy feeling steals over us, and old people usually go to sleep during the afternoon. Sitting in front of a hot fire on a winter afternoon or evening will also have this effect. Well, the same sort of thing happens to animals, but with them it is a sleep for a season. Reptiles are most commonly affected in this way. The crocodile makes himself a bed deep down in the mud, and lets the sun bake the latter into a hard crust round him, and there he stays until rain comes to swell the river in which he makes his home. Then he breaks out of his muddy cradle, and is alert and hungry.

Snakes hide themselves in the same way, but let us beware of disturbing one. Summer-sleeping serpents are vicious if aroused. But the sleep during summer is not confined to the reptiles; the mud-fishes make a place for themselves in the mud. The water of the river dries up; the mud hardens until it is like stone, but the fish lies asleep inside, absolutely unharmed. And while it is in that state we can dig it up in its muddy case and bring it over the ocean, and wash it out of its earth into a tank in one of our conservatories, and it will live and flourish.

It is necessary that some animals should go to sleep to avoid the hardships of winter; it is just as necessary that others should sleep during the scorching heat of summer. The blazing sun of tropical lands burns up the vegetation, and dries up the streams. If these animals remained awake, there would be nothing for them to eat. They have, therefore, to make the best of matters where they are.

CONTINUED FROM PAGE 6102.

SOME authors write histories, some biographies, some novels, some works of science, but Henry David Thoreau, author of "Walden," did none of these. He wrote Nature books, delightful stories of his life in the fields and the woods — tales of the birds and the bees and the flowers. In "Walden," in "The Maine Woods," in "Excursions," we hear the sweep of the wind through the treetops, and the chatter of the squirrels, or feel the snow crunch under our feet or hear the swish of the rain-wet grass in the summertime as "really truly" as if we were living in the woods ourselves.

WALDEN: By HENRY DAVID THOREAU

SPRINGTIME AT WALDEN POND

As it grew darker, I was startled by the *honking* of geese flying low over the woods, like weary travellers getting in late from southern lakes. Standing at my door, I could hear the rush of their wings; when, driving toward my house, they suddenly spied my light, and with hushed clamour wheeled and settled in the pond. In the morning I watched the geese from the door through the mist, sailing in the middle of the pond, fifty rods off, so large and tumultuous that Walden appeared like an artificial pond for their amusement. But when I stood on the shore they at once rose up with a great flapping of wings at the signal of their commander, and when they had got into rank circled about over my head, twenty-nine of them, and then steered straight for Canada, with a regular *honk* from the leader at intervals.

At the approach of spring the red-squirrels got under my house, two at a time, directly under my feet as I sat reading or writing, and kept up the queerest chuckling and chirruping and vocal pirouetting and gurgling sounds that ever were heard; and when I stamped they only chirruped the louder, as if past all fear and respect in their mad pranks, defying humanity to stop them. No you don't — chickaree — chickaree. They were wholly deaf to my arguments, or failed to perceive their force and fell into a strain of invective that was irresistible.

The first sparrow of spring! The faint silvery warblings heard over the partially bare and moist fields from the blue-bird, the song sparrow, and the red-wing, as if the last flakes of winter tinkled as they fell. The marsh-hawk, sailing low over the meadow is already seeking the first slimy life that awakes. The sinking sound of melting snow is heard in all dells, and the ice dissolves apace in the ponds. The grass flames up on the hillsides like a spring fire, as if the earth sent forth an inward heat to greet the returning sun.

THE BATTLE OF THE ANTS

One day when I went out to my wood-pile, or rather my pile of stumps, I observed two large ants, the one red, the other much larger, nearly half an inch long, and black, fiercely contending with one another. Having once got hold they never let go, but struggled and wrestled and rolled on the chips incessantly. Looking farther, I was surprised to find that the chips were covered with such combatants, that it was not a duel but a war between two races of ants, the red always pitted against the black, and frequently two red ones to one black. The legions of these Myrmidons covered all the hills and vales in my wood-yard, and the ground was already strewn with the dead and dying, both red and black. On every side they were engaged in deadly combat, yet without any noise that I could hear, and human soldiers

never fought so resolutely. I watched a couple that were fast locked in each other's embraces, in a little valley amid the chips, now at noonday prepared to fight till the sun went down, or life went out. The smaller red champion had fastened himself like a vise to his adversary's front, and through all the tumblings on that field never for an instant ceased to gnaw at one of his feelers near the root, having caused the other to go by the board; while the stronger black one dashed him from side to side, and, as I saw on looking nearer, had already divested him of several of his members. They fought with more pertinacity than bull-dogs. Neither manifested the least disposition to retreat. It was evident that their battle-cry was Conquer or die. In the meanwhile there came along a single red ant on the hillside of this valley, evidently full of excitement, who either had despatched his foe, or had not yet taken part in the battle; probably the latter, for he had lost none of his limbs; whose mother had charged him to return with his shield or upon it. He saw this unequal combat from afar, — for the blacks were nearly twice the size of the red, — he drew near with rapid pace till he stood on his guard within half an inch of the combatants; then, watching his opportunity, he sprang upon the black warrior, and commenced his operations near the root of his right fore-leg, leaving the foe to select among his own members.

I took up the chip on which the three I have particularly described were struggling, carried it into my house, and placed it under a tumbler on my window-sill, in order to see the issue. Holding a microscope to the first mentioned red ant, I saw that, though he was assiduously gnawing at the near fore-leg of his enemy, having severed his remaining feeler, his own breast was all torn away, exposing what vitals he had there to the jaws of the black warrior, whose breast-plate was apparently too thick for him to pierce; and the dark carbuncles of the sufferer's eyes shone with ferocity such as war only could excite. They struggled half an hour longer under the tumbler, and when I looked again the black soldier had severed the heads of his foes from their bodies, and the still living heads were hanging on either side of him like ghastly trophies at his saddle-bow, still apparently as firmly fastened as ever, and he was endeavouring with feeble struggles, being without feelers and with only the remnant of a leg, and I know not how many other wounds, to divest himself of them; which at length after half an hour more, he accomplished. I raised the glass, and he went off over the window-sill in that crippled state. Whether he finally survived that combat, and spent the remainder of his days in some Hotel des Invalides, I do not know; but I thought that his industry would not be worth much hereafter. I never learned which party was victorious, nor the cause of the war; but I felt for the rest of the day as if I had my feelings excited and harrowed by witnessing the struggle, the ferocity and carnage, of a human battle before my door.

CAPTURE OF THE INCA: By WILLIAM HICKLING PRESCOTT

"The Capture of the Inca" is an exciting bit of narrative taken from Prescott's "Conquest of Peru," a book which most girls and all boys will enjoy reading. The book tells the romantic story of the Spaniards' march over the Andes and of the wonderful ancient towns and tribes that lived long ago in those great South American mountains. In the selection given here, the Spaniards, under Pizarro, their commander, have just entered the city of Caxamalca, and are about to entrap the Inca — or Indian king. "The Conquest of Peru," like Prescott's other entertaining histories, was written by the author under the greatest difficulties, as he had but the use of one eye, the other having been blinded in a school-boy frolic by a blow on the eyeball with a hard crust of bread.

It was not long before sunset when the van of the royal procession entered the gates of the city. First came some hundreds of the menials, employed to clear the path from every obstacle, and singing songs of triumph as they came, "which, in our ears," says one of the Con-

querors, "sounded like the sounds of hell!" Then followed other bodies of different ranks, and dressed in different liveries. Some wore a showy stuff, checkered white and red, like the squares of a chess-board. Others were clad in pure white, bearing hammers or maces of silver or copper; and the guards, together with those in immediate attendance on the prince, were distinguished by a rich azure livery, while the large pendants attached to the ears indicated the Peruvian noble.

Elevated high above his vassals came the Inca Atahuallpa, borne on a sedan or open litter, on which was a sort of throne made of massive gold of inestimable value. The palanquin was lined with the richly-coloured plumes of tropical birds, and studded with shining plates of gold and silver. The monarch's attire was much richer than on the preceding evening. Round his neck was suspended a collar of emeralds, of uncommon size and brilliancy. His short hair was decorated with golden ornaments, and the imperial borla encircled his temples. The bearing of the Inca was sedate and dignified; and from his lofty station he looked down on the multitudes below with an air of composure, like one accustomed to command.

As the leading files of the procession entered the great square, larger, says an old chronicler, than any square in Spain, they opened to the right and left for the royal retinue to pass. Everything was conducted in admirable order. The monarch was permitted to traverse the plaza in silence, and not a Spaniard was to be seen. When some five or six thousand of his people had entered the place, Atahuallpa halted, and, turning round with an inquiring look, demanded, "Where are the strangers?"

At this moment Fray Vicente de Valverde, a Dominican friar, Pizarro's chaplain, and afterwards Bishop of Cuzco, came forward with his breviary, or as other accounts state, a Bible, in one hand, and a crucifix in the other, and, approaching the Inca, told him that he came by order of his commander to expound to him the doctrines of the true faith, for which purpose the Spaniards had come from a great distance to his country. The friar then explained, as clearly as he could, the mysterious doctrine of the Trinity, and, ascending high in his account, began with the creation of man, thence passed to his fall, to his subsequent redemption by Jesus Christ, to the crucifixion and the ascension, when the Saviour left the Apostle Peter as his Vicegerent upon earth. The friar concluded with beseeching the Peruvian monarch to receive him kindly; to abjure the errors of his own faith, and embrace that of the Christian now proffered to him, the only one by which he could hope for salvation; and, furthermore, to acknowledge himself a tributary of the Emperor Charles the Fifth, who, in that event, would aid and protect him as his loyal vassal.

The eyes of the Indian monarch flashed fire, and his dark brow grew darker as he replied, "I will be no man's tributary! I am greater than any prince on earth. Your emperor may be a great prince; I do not doubt it, when I see that he has sent his subjects so far across the waters; and I am willing to hold him as a brother. As for the Pope of whom you speak, he must be crazy to talk of giving away countries which do not belong to him. For my faith," he continued, "I will not change it. Your own God, as you say, was put to death by the very men whom he created. But mine," he concluded, pointing to his deity, — then alas! sinking in glory behind the mountains, — "my God still lives in the heavens, and looks down on his children."

He then demanded of Valverde by what authority he had said these things. The friar pointed to the book which he held as his authority. Atahuallpa, taking it, turned over the pages a moment, then, as the insult he had received probably flashed across his mind, he threw it down with vehemence, and exclaimed, "Tell your comrades that they shall give me an

account of their doings in my land. I will not go from here till they have made me full satisfaction for all the wrongs they have committed."

The friar, greatly scandalised by the indignity offered to the sacred volume, stayed only to pick it up, and hastening to Pizarro, informed him of what had been done, exclaiming at the same time, "Do you not see, that, while we stand here wasting our breath in talking with the dog, full of pride as he is, the fields are filling with Indians! Set on at once! I absolve you." Pizarro saw that the hour had come. He waved a white scarf in the air, the appointed signal. The fatal gun was fired from the fortress. Then springing into the square, the Spanish captain and his followers shouted the old war-cry of "St. Jago and at them!" It was answered by the battle-cry of every Spaniard in the city, as, rushing from the avenues of the great halls in which they were concealed, they poured into the plaza, horse and foot, each in his own dark column, and threw themselves into the midst of the Indian crowd. The latter, taken by surprise, stunned by the report of artillery and muskets, the echoes of which reverberated like thunder from the surrounding buildings, and blinded by the smoke which rolled in sulphurous volumes along the square, were seized with a panic. They knew not whither to fly for refuge from the coming ruin. Nobles and commoners, — all were trampled down under the fierce charge of the cavalry, who dealt their blows right and left, without sparing; while their swords flashing through the thick gloom, carried dismay into the hearts of the wretched natives, who now, for the first time, saw the horse and his rider in all their terrors. They made no resistance, — as, indeed, they had no weapons with which to make it. Every avenue to escape was closed, for the entrance to the square was choked up with the dead bodies of men who perished in vain efforts to fly; and such was the agony of the survivors under the terrible pressure of their assailants, that a large body of Indians, by their convulsive struggles, burst through the wall of stone and dried clay which formed part of the boundary of the plaza! It fell, leaving an opening of more than a hundred paces, through which multitudes now found their way into the country.

Meanwhile the fight, or rather massacre, continued hot around the Inca, whose person was the great object of the assault. His faithful nobles, rallying about him, threw themselves in the way of the assailants, and strove, by tearing them from their saddles, or, at least, by offering their own bosoms as a mark for their vengeance, to shield their beloved master. . . .

The Indian monarch, stunned and bewildered, saw his faithful subjects falling around him without comprehending his situation. The litter on which he rode heaved to and fro, as the mighty press swayed backwards and forwards; and he gazed on the overwhelming ruin, like some forlorn mariner, who, tossed about in his bark by the furious elements, sees the lightning's flash and hears the thunder bursting around him, with the consciousness that he can do nothing to avert his fate. At length, weary with the work of destruction, the Spaniards, as the shades of evening grew deeper, felt afraid that the royal prize might, after all, elude them; and some of the cavaliers made a desperate attempt to end the affray at once by taking Atahuallpa's life. But Pizarro, who was nearest his person, called out with stentorian voice, "Let no one who values his life, strike at the Inca;" and, stretching out his arm to shield him, received a wound on the hand from one of his own men, — the only wound received by a Spaniard in the action.

The struggle now became fiercer than ever round the royal litter. It reeled more and more, and at length several of the nobles who supported it having been slain, it was overturned and the Indian prince would have come with violence to the ground, had not his fall been broken, by the efforts of Pizarro and some other of the cavaliers, who caught him in their arms.

CONTINUED FROM PAGE 6201

THE FIRST APPLE DUMPLING

THE princess was looking up at the apple-tree, when — plop! down fell an apple at her feet!

It was not a common, ordinary apple, or it would not have been growing there, but a golden pippin.

"Oh dear!" said the princess, picking it up. "I hope you haven't hurt yourself."

"They dared me to do it," said the apple — "the other apples, you know. They said I should be afraid to let go my stalk and jump. And now I *have* done it, and I'm sorry, for someone will want to eat me, and I am not nearly ripe enough!"

"I will hide you," said the princess.

And she ran into the palace to look for a hiding-place. But whenever she opened a box or a cupboard the apple cried, "That won't do. Someone will be sure to find me there!"

The princess went all over the palace, upstairs and down, looking for a safe hiding-place for the apple; and at last she came to the kitchen. The chief cook was rolling out paste with a golden rolling-pin to make a roly-poly pudding with golden syrup in it for the princess's dinner.

She was still looking about for a hiding-place when one of the silver saucepans boiled over, and the chief cook left off rolling the paste to attend to it. The instant his back was turned, the princess took some paste and wrapped the apple up in it.

"No one will think of looking for you there," she whispered.

Then she saw that the door of an oven, out of which a cook had just taken a tray of tarts, was open, and she popped the apple in, to hide it twice over, and went away.

"Dear me, what is this?" asked the king at dinner, as he caught sight of a round brown thing on a dish.

"I don't know, your Majesty," was the answer. "The chief cook said he found it in the oven."

"It looks rather like a baked snowball," said the king. "But it smells good. Give me a knife, and I'll see."

"My dear," said the queen, "pray be careful. Suppose it should go off suddenly and blow us up!"

"Pooh!" said the king boldly. "Who's afraid?" And he cut it in two with a single stroke of the knife.

"Why," he said, "it looks like an apple. And yet it can't be. For how could an apple get inside — "

"If you please, papa," put in the princess, "I think it must be the apple I had. It wasn't ripe, you know, and was afraid someone would eat it. But perhaps it won't mind so much now it is cooked. And I think I should like a piece."

The next day the king said:

"Tell the chief cook to ask the princess to be so good as to show him how to hide some more apples."

And that is how apple dumplings were first invented.

THE FIRST HOME, SWEET HOME

A TALE OF A HUNDRED THOUSAND YEARS AGO

AFTER the wild dog pack swept all the animals from the land around the Thames, Wawa and his tribe had bad living. They were hunters who fed chiefly on meat. They did not know how to till the soil and grow food, and were compelled to live on acorns and wild fruit.

Swar did not like acorns.

WAWA SAT THINKING HOW TO KEEP UP THE FIRE

"This is pigs' food," he said, one day, to his father. "Even my dog will not eat it!"

"He'll eat it," said Wawa impatiently, "when he is starving like the rest of us."

But the strange thing was that Swar's little dog never seemed to get hungry. Wawa sat by the great camp fire on Cornhill, trying to think how he could get meat for the tribe to live on. Like his people, he was very lean and worn, and he was losing his wonderful strength of arm.

"I am afraid, my little son," he said to Swar, "we must tramp back and see if the terrible dog pack has left any game there. We shall starve if we stay here."

He rose up wearily to examine the trees and make plans for building a huge raft. The Thames in those days was a wide swirl of water resembling the Amazon and the Mississippi. Instead of flowing into the sea, it ran into the Rhine. It was more by chance than by skill that the tribe had crossed the river safely in the summer; and now that it was swollen with autumn rains, it seemed impossible to return.

"Still, we must risk it," said Wawa, speaking round the camp fire that evening to all the tribe. "It is clear that if we stay here we shall perish. The wild dog pack may return and destroy us. Even if we escape that danger, we shall not live through the winter, with nothing growing on the trees, and no game in the forest."

As he spoke, the little dog came running through the jungle with something in its mouth. Terror, as he was now called, dropped what he carried at Swar's feet, and then looked up in the boy's face, waiting for a sign of approval.

"By all the glory of the sun," shouted Wawa joyfully, "the little Terror has saved us! Look, he has brought good meat!"

"Hunting! Good hunting!" shouted the tribesmen.

Wawa held up a dead rabbit. Being hunters of big game, he and his men had only searched the jungle for the tracks of deer and of wild sheep and oxen. The night raid of the dog pack

had killed many rabbits and those that remained dared not show themselves in the daylight. Terror had hunted them by scent in the darkness. Having made a good meal, he had killed for his companions, and brought his kill to Swar.

Terror was furious when Wawa seized the rabbit and held it up for the tribe to see. Leaping up with a snarl, he dragged the animal out of the chief's hand, and again laid it at Swar's feet, and then stood by, growling, ready to attack anybody who tried to rob his master of the spoil.

Wawa roared with laughter, and stooped and patted the faithful dog.

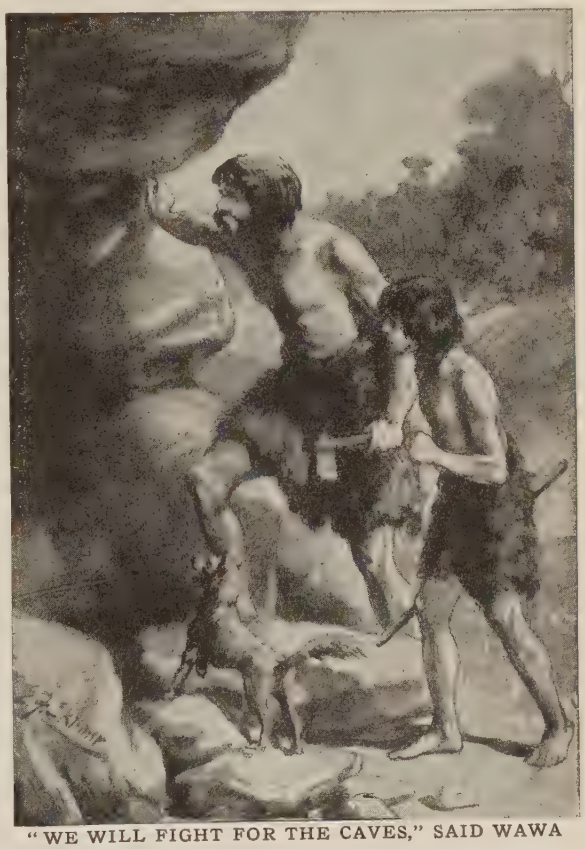
"Well done, Terror!" he said. "After all, Swar is your chief, and you owe your life to him. He shall have the rabbit, and we shall all profit by the lesson you have given us."

All thought of re-crossing the mighty river was now given up. The young tribesmen were soon busily engaged in searching for rabbits. The older men made a temporary camp in a flint quarry, and chipped some of the smaller flints into small rough stone knives, sharper-edged than the great stone axes they were accustomed to use. Then the women, taking new knives, with infinite care, cut the skins of their tents into thin strips of leather, and with these made a great quantity of snares, which were placed over all the rabbit holes found in the forest.

Thus the tribe at last managed to get food as winter was coming on, when fruit of all kinds was becoming rare. Unfortunately, all the tent skins had to be used in making the snares, and when it began to rain heavily, life in the camp became very uncomfortable.

There were days when the great tribal fire was almost put out by the continual downpour, and Wawa became very anxious. In those days there was no one who knew how to kindle a fire. Men had not discovered how to make a flame. It was from rare forest fires and from distant volcanoes that the tribes obtained the blaze they guarded so carefully.

Wawa had carried his precious fire all the way from France, and had built rafts to carry it over the rivers he crossed on his strange journey into the unexplored jungles of England. Now he sat thinking vainly for hours of some means of preserving the sacred camp fire from being put out by the unceasing torrent of rain.



"WE WILL FIGHT FOR THE CAVES," SAID WAWA

Wawa was a very wise man — one of the wisest men who ever lived in any period of the history of the world. He was only a savage, ignorant of everything on which our own civilised life is based. No savage in the wildest country at the present day is as wild as he was. He and his people clad themselves in skins which they could not even roughly sew together. Several

thousand years had to pass before men learned how to make a rough needle by boring through a small wing-bone of a bird. Another vast period of time then followed before men discovered how to sow grain and gather it and store it. There are some ants — farmer-ants they are called — that do this. But no man in Wawa's time was as wise as these ants.

And yet, though he lived in that far-off time, Wawa was a man of genius. He could invent new things. It was by the slow and painful efforts of men of his sort that mankind gradually improved its way of living. Wawa first tried to protect his fire from the rain by building over it a rough shelter of leafy boughs. But the shelter was so badly built that the wind blew it down, and, in falling, it almost put out the fire.

"So that won't do!" said Wawa angrily.

Not knowing how to sew, he could not make new coverings out of rabbit-skins, and for some hours he sat by the flickering fire, puzzling his brains. He did not go to sleep that night.

"Come with me, Swar," he said to his little son, at daybreak, "and bring your dog with you. I want to explore that hill where I found you with the lioness."

Nothing stirred in the jungle, and when they came to the northern height, they found that that too was deserted. The wild dog pack had swept the caves in the hillside free from the huge beasts of prey that used to dwell there.

"The great beasts will come back," said Swar, "won't they, Daddy?"

"Yes, my son," said the chief grimly. "They'll come back when the deer and the other game return. But they will find their caves occupied. Then we will fight for the caves, and see who is master, man or the animals!"

That was how, thousands of years ago, man first made a home in a cave.

WHEN THE FIRE WENT OUT

Outside the largest of the caves on the northern heights of London, a little boy, clad in a tiger-skin, was hammering at a flint with a stone axe. All around stretched the rank, green jungle growth. Over the tops of the sycamores and fig-trees the Thames could be seen, a great breadth of shining water, nearly a mile broad in places, and terribly swift. It swept into the Rhine. This was thousands of years ago.

"Look at the fire in the stone!" cried the little boy to his father, as with his stone axe he struck sparks out of the flint. "Oh, look at the fire in the stone!"

A broad-shouldered man, a mane of red hair falling over his back, and a great red beard and moustache almost hiding his face, came out of the cave, laughing. He was Wawa, the chief who had led his tribe across the river which divided France from England.

"So you have found out, little Swar," he said, "that there is fire magic in stones. All the tribe knows that, my little son."

"Then why don't you make a fire with it?" said Swar.

"We can't make fire out of magic," said Wawa rather sadly. "Not even the greatest wizard can do that. By the flaming sun, I wish we could get fire from the stone, now that the rains are setting in!"

And he went back slowly into the great cave to see that the tribal fire was burning well and bright. In those distant days man had not yet learned how to make fire. Here and there a tribe had found a forest blazing in a summer drought, and, snatching some flaming branches, had made a fire. In other places, far to the south of Europe, fire had been got from a volcano. It was the thing which the poor ignorant savages valued most.

On the young unmarried girls of the tribe fell the duty of feeding the fire night and day, and keeping it alight. The tribesmen used the fire to harden and sharpen the wooden spears with which they did most of their hunting. After being charred, the ends of the wooden sticks were scraped with sharp

flints. It took a week to chip into shape a great stone axe, while with a fire a wooden spear could be made in a minute or two; so these spears only were employed in ordinary hunting.

Swar, who had just reached his seventh year, had resolved to attack nothing smaller than a mammoth. There were several of these huge, woolly elephants in the jungle which stretched between Hampstead and the Thames; and two days before, while Swar was squatting by his father's side near where Camden Town now is, he had caught a glimpse of one of the great beasts.

In serious, childlike fashion he went on hammering at the big stone which he wished to make into an axe. Sometimes he hit the stone; sometimes he hit his fingers. There was not enough strength in his little brown hands to strike the least bit off the great flint. Terror, the wild dog which he had found when a puppy, and trained, kept frisking round him, and trying to get him to play. But for some time Swar vainly went on with his work. He had seen two tribesmen making a tremendous stone axe for his father, and naturally he, too, wanted to make one for himself.

Suddenly he was interrupted. A young tribesman came running up the hill, breathless and wild with excitement.

"Deer!" he shouted, "A great herd of deer down by the river!"

Out of all the caves rushed a crowd of joyous men and women and children. Winter-time was at hand, and the tribe had not seen any big game for months.

"Seven spears for every man!" cried Wawa, in a loud voice. "And down to the water at once! Women and children follow, and help to bring the meat home!"

Then Bina, his wife, spoke.

"But some one must remain at home to tend the fire," she said.

"Well, let the youngest children do that," exclaimed Wawa. "You know how we had to starve all the summer. It may be worse in the winter if the dog-pack returns and sweeps the jungle again."

"Yes, yes!" shrieked all the tribesmen, dancing in excitement, and waving their spears above their heads. "We cannot lose a single deer. Leave one of their bodies for a minute, and a wolf or hyena will get it. The chief is right. All the women must come with us."

Wawa was already running down through the jungle at a hard, steady pace. His men whooped, and then followed him silently and swiftly; and the women and girls and older boys went after the men.

Bina stayed behind for a minute, and talked to her little son.

"Now, Swar," she said very earnestly, "you must be a great chief like your father, and see that all the children keep the fire burning. Make them bring a lot of branches and put them all carefully on the flames."

"Very well, mother," said Swar proudly. "You'll see, I'll make the biggest fire in the whole world."

When his mother went away it began to rain heavily. But this did not daunt Swar. It was the first time he had been set in authority, and he was resolved to astonish the tribe by his magnificent work. He kept the children for hours running out into the jungle, and tearing down wet, dripping branches. At last a big mass of soaking leaves was built above the fire, and Swar was still keeping the children busily employed, when the tribesmen came tramping back with the spoils of the hunting.

Wawa dropped the two deer he was carrying when he saw what his little boy had done.

"By all the splendour of the sun," he cried, in a wild voice, "what have you children done to the fire?"

He began to tear away the stack of wet leaves. Quickly the men saw what was the matter, and so did the women. Shrieking with fright, they, too, tore at the wet green stuff, and at last pulled it all off the hearth. But it was too late — the rain-water had completely put out the fire. Where it had been, there was now only a pool of mud.

In the darkest corner of the cave

crouched Swar, sobbing as though his heart would break. His father was too upset to be angry with his little boy. The loss of the fire was the most terrible disaster which could have occurred to a tribe. It left them open to attack from the most cunning and the most savage of all the wild beasts — the huge cave bear and the huge cave lion. At first Wawa thought it would be safer to camp out in the jungle; but it was still raining heavily, and the tribe now had no skin tents. They had used all their skins in making snares.

"Well," he said, at last, "the women and children must sleep together in this big cave, and the men must take turns in keeping awake and watching over them."

"You sleep, too, chief," said one of his men. "You must be more tired than any of us."

"No, I will help you keep watch," said Wawa wearily. "I must think of a way," he added. "Oh, if only there was a tribe from whom we could borrow fire!"

But there was no other tribe within a hundred and fifty or two hundred miles.

"It will be necessary," thought Wawa sadly to himself, "to go back across the river."

As he was considering whether he should wait till the meat was cured, or lead his tribe away at daybreak, a little figure came and nestled up to him.

"Father," said Swar softly, "couldn't we get some of the magic fire out of the stone?"

Wawa shook his head. He looked down at the ground, thinking of other things, and his eyes idly rested on a heap of dry leaves in a corner. The dawn was just breaking.

"That's it!" cried Swar, following his glance. "Let us set light to the leaves with the fire in the stone."

Sitting among the dry, withered stuff, he began eagerly to strike fire from the flint. His father watched him listlessly. Suddenly he started up with a cry of joy, and, taking the stone and the flint axe from his little son, he began to strike them together quickly and lightly and steadily. He had seen a spark burn a tiny hole in a very dry leaf.

Half an hour afterwards the men and women and children were awakened by a wild, shrill, strange song. Wawa was dancing about the cave, singing and holding Swar above his head. In a corner was a little smoking heap of leaves and twigs. Man had made the great discovery — he had found out how to make fire.

HOW THEY GOT A HOLIDAY

Some schoolboys, who had failed to obtain a coveted holiday, thought of a plan for getting the schoolmaster out of the way.

"If we could only get him to think he is ill," said the eldest of them, "he would be ill" — which was perfectly true. So they arranged that, as they entered the school the next day, each one should say to the master: "Good-morning, sir! I am sorry to see you looking so ill." The schoolmaster replied, "Ill? I'm sure I don't feel ill."

But when others made the same remark, after a little he shut his book, and said he would return home.

So the boys got their holiday. But the next morning they found nobody at the school.

"The master must be really ill," said the boys. "We had better inquire."

On the way they met a man, who told them that the schoolmaster lay tossing on his bed in a fever.

"Follow me," said the eldest boy, "and do as I do."

He led them into the sick-room, and, going up to the master, said: "Good-morning, sir! You are looking quite yourself again."

"Am I?" said the schoolmaster. "I was feeling very ill."

"Oh, no," said the boys. "You are nearly well again. You ought to get up and take a walk."

"Perhaps you are right," said the sick man. He got up, and in a few hours had quite recovered.

GENERAL INDEX TO THE BOOK OF KNOWLEDGE

For titles of poems or first lines see Special Poetry Index following the General Index. Author's names are in both the indexes.

THIS Index, containing about twenty-five thousand entries, will enable you to find very quickly everything contained in The Book of Knowledge. It is not arranged exactly like an ordinary index, for the Book of Knowledge is not like any other book in the world. The book does not contain all the accumulated knowledge of the ages, but *those things which it is most important to know*, arranged so that they can be quickly and easily understood. Like an ordinary index, it is arranged alphabetically. In addition a number of the most important departments of knowledge in our index have special indexes of their own.

Many subjects are indexed twice or even three times. For example, you wish to know something about the Sun: look for the word and you will find dozens of references to the Sun and its work. Under THE BOOK OF THE EARTH you will find the story of the Sun and the Earth together. You will find Hockey in its place under the letter *H* and also under *Games*. You will have little trouble if you think for a second before you look.

The Special Poetry Index will prove a great help. The names of the authors are in the Great Index under their proper letters. They are also found in the Special Index and under each name are the titles of the poems by that author. Suppose you do not know an author's name: the titles of the poems and the first lines are given in their proper place according to the first letter of the first word, except that *A*, *An* and *The* are not considered words.

The book contains nearly ten thousand pictures, and, of course, only the most important could be indexed separately, but you will have little trouble in finding what you want. Almost every article is illustrated, and if you look in the index for the most important word in the subject you are likely to find pictures on or near the pages to which you are directed.

Think of what you want and look under the most important word. If you want a person, look under his name; if you want a country, look under its name. Everything is indexed under the word you are most likely to think of. For Poetry, see the Special Poetry Index.

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Child's Book of Familiar Things

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LIFE

The Child's Book of Its Own Life

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MEN AND WOMEN

Child's Book of Men and Women

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NATURE

Child's Book of Nature

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SPECIAL INDEX OF POEMS & NURSERY RHYMES

THIS is probably the most complete index of verses for boys and girls appearing in any book. The names of poets are in the general index, but in this special index a poem is entered three times, so that it can be found if we know either the title, the first line, or the author's name.

The collection of poetry in the Children's Encyclopædia is made up of separate pieces, and they represent every kind of verse. There are sonnets, songs, odes, dramatic pieces, humorous verses, hymns, and psalms; nursery rhymes in English and French; folk-lore songs of Germany; songs set to music; nonsense verses; and selections from Shakespeare and many other poets whose works are too long to quote as a whole. Illustrations are not indexed.

Not only is this collection the biggest and most representative collection ever made for children, but it is arranged on an educational plan, which not merely aims at cultivating a love for poetry in the minds of boys and girls, but also attempts to build up in the minds of readers a conception of the general nature of a poet's work, and of the meaning of particular poems. Every poem, moreover, has a special introduction, giving information about the author or the poem. The Poetry section, therefore, is a true education in the very best kind of literature.

All the poems of an author are together under his name. They are *indented* under the name, that is to say, the titles begin a little way on in the line, not straight with the other lines. This means that all poems with these short lines are by the author whose name is above them.

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